DEC 2 3 1945

Vol. 57 DECEMBER 1945 No. 4

The Wilson Bulletin

Published by the

Wilson Ornithological Club

at

Ann Arbor, Michigan

CONTENTS

STUDIES OF CENTRAL AMERICAN REDSTARTS Alexander F. Skutch 217

BIRD DISTRIBUTION AND ECOLOGICAL CONCEPTS, A SYMPOSIUM

Part 2. Birds of a Deciduous Forest Aquatic Succession John W. Aldrich 243

Part 3. Birds of the Deciduous Forest Joseph J. Hickey 245

Part 4. Grassland Birds O. A. Stevens 247

Part 5. Coniferous Forest Birds Roger Tory Peterson 247

Part 6. The Relative Merits of the Life Zone and Biome Concepts V. E. Shelford 248

WINTER NIGHT HABITS OF BIRDS A. D. Moore 253

GENERAL NOTES—*Colorado nesting records of Starlings*, R. J. Niedrach; *Robin using abandoned Cardinal nest*, H. Brackbill; *Absorbent for use in the preparation of scientific skins*, A. W. Schorger; *Black and White Warbler feeding young of Worm-eating Warbler*, G. Rea 261

REPORTS 262, 271

EDITORIAL. ORNITHOLOGICAL NEWS 263

ORNITHOLOGICAL LITERATURE 265

NEW LIFE MEMBERS 272

MEMBERSHIP ROLL 273

INDEX TO VOLUME 57, 1945 302

THE WILSON BULLETIN

the official organ of the Wilson Ornithological Club, is published quarterly, in March, June, September, and December, at Ann Arbor, Michigan. In the United States the subscription price is $2.00 a year. Single copies, 50 cents. Outside of the United States the rate is $2.25. Single copies, 60 cents. Subscriptions should be sent to the Treasurer. Most back issues of the *Bulletin* are available at 50 cents each and may be ordered from the Editor.

All articles and communications for publication, books and publications for review, exchanges, and claims for lost or undelivered copies of the magazine, should be addressed to the Editor.

The current issue of *The Wilson Bulletin* is printed by the Ann Arbor Press, Ann Arbor, Michigan. Entered as second class matter July 13, 1916, at Ann Arbor, Michigan, under the Act of March 3, 1879.

THE WILSON ORNITHOLOGICAL CLUB

Founded December 3, 1888. Named after Alexander Wilson, the first American ornithologist. The officers for the current year are:

President—S. Charles Kendeigh, University of Illinois, Champaign, Ill.
First Vice-President—O. S. Pettingill, Jr., Carleton College, Northfield, Minn.
Second Vice-President—H. F. Lewis, Dept. of Mines and Resources, Ottawa, Ont.
Treasurer—M. B. Trautman, Stone Laboratory, Put-in-Bay, Ohio.
Secretary—Maurice Brooks, University of West Virginia, Morgantown, W. Va.
Editor—Josselyn Van Tyne, University of Michigan, Ann Arbor, Mich.
Associate Editors—Margaret M. Nice and F. N. Hamerstrom, Jr.
Assistant Editor—G. Reeves Butchart.

Membership dues per calendar year are: Sustaining, $5.00; Active, $3.00; Associate, $2.00. *The Wilson Bulletin* is sent to all members not in arrears for dues.

PLATE 12

Near Tecpán, Guatemala *May 15, 1933*

Nest of the Pacific Orange-bellied Redstart

(Myioborus miniatus hellmayri)

UNIV. OF MICH.

THE WILSON BULLETIN
A QUARTERLY MAGAZINE OF ORNITHOLOGY
Published by the Wilson Ornithological Club

Vol. 57 DECEMBER 1945 No. 4

STUDIES OF CENTRAL AMERICAN REDSTARTS

BY ALEXANDER F. SKUTCH

NORTH American wood warblers are highly migratory, exhibit pronounced sexual differences in coloration, and often show marked seasonal changes in plumage. So numerous are these delightful little birds in temperate North America that one is likely to forget that the family is best represented in tropical America, where the species, though few at sea-level, become ever more numerous with increasing elevation. These tropical members of the family are typically non-migratory; even among the most brilliant of them the sexes are often alike or nearly so; seasonal changes in coloration are exceptional if not entirely absent; and, as a corollary, the young birds, in many species at least, acquire the adult plumage in the postjuvenal rather than in the prenuptial molt.

During the two years I spent in bird study in the Central American highlands (1933 in Guatemala, 1937–38 in Costa Rica), I was able to learn something of the habits of three forms of *Myioborus*, a genus of brightly colored wood warblers occurring from Mexico to Bolivia, chiefly in the subtropical zone, but sometimes also in the tropical and temperate zones. Unfortunately, limitations of time prevented my making any of these three forms a major study—interesting as these birds were, they seemed in less urgent need of investigation than some of the neighboring birds of non-passerine families, which in general are less well known than the wood warblers. Yet so far as I am aware, almost nothing has been published concerning the life history of the tropical warblers, and it is to help bridge this gap in our knowledge of the family that these notes are presented. Although none of the three life histories can claim even approximate completeness, they seem to complement one another; taken together they give a fair picture of the lives of these attractive mountain forest birds.

Pacific Orange-bellied Redstart

The Pacific Orange-bellied Redstart (*Myioborus miniatus hellmayri*) is a northern representative of a group of wood warblers widely distributed in the mountainous regions of Central America and

tropical South America. The species is known to range from Mexico to Peru, and several races have been described; *hellmayri* [1] is confined to the western highlands of Guatemala and extreme southwestern El Salvador. In Guatemala, I met it at many points, and in 1933 found its nest on the Sierra de Tecpán, Department of Chimaltenango, at an altitude of about 8,500 feet. I have seen it at points ranging from 2,000 to 9,500 feet above sea-level, although at both of these extremes of elevation it is rare. It is particularly abundant in the heavy, humid forests at middle altitudes on the Pacific slope, from 5,000 to 7,000 feet above sea-level, as, for example, on the wooded flanks of the Volcán Zunil opposite Santa María de Jesús, where in July and August, 1934, I found it among the most conspicuous members of the avifauna.

Appearance and habits. This warbler is a bird of striking and distinctive appearance. Most of its head, its back, wings, and most of the tail, throat, and the sides of its breast, are dark slate-color; the center of the crown is chestnut; and the outer tail feathers are broadly tipped with white; most of the breast and the belly are a beautiful bright color, something between orange and red—almost the shade of a tangerine orange. The male and female are colored so nearly alike that it is usually not possible to recognize any difference in their brightness unless one sees them side by side.

This restlessly active little bird catches a large part of its insect food upon the wing. It flits airily amid the foliage, or with consummate deftness weaves an intricate course among the branches, to reach some insect it has seen in a distant part of the tree; or it darts swiftly in pursuit of some creature that has taken flight, twisting, turning, and doubling in the air with amazing skill. In its quieter intervals of hopping and jumping among the branches it often droops its wings, and spreads its tail, displaying the broad white tips of the outer feathers, which contrast prettily with the dark slaty color of the others.

Except during the breeding season, an individual of this subspecies strictly avoids the company of its own kind but attaches itself to one of the large mixed flocks of wood warblers and other small birds that roam through the highland forests, in each of which there is usually a single Orange-bellied Redstart. Here it is conspicuous by reason of its spectacular flight, its flaming breast, and its habit of continually spreading its tail. As the breeding season approaches, the males attract still

---

[1] The eggs and nestlings noted under *"Myioborus miniatus connectens"* in my paper on incubation and nestling periods (*Auk*, 62, 1945:23) are from the nest described here under *"Myioborus miniatus hellmayri."* The editor followed Hellmayr ("Birds of the Americas") in using *"connectens"* for the Guatemalan form. But van Rossem in his revision of the species (*Condor*, 38, 1936:117–118) calls the form that occurs in western Guatemala and extreme southwestern El Salvador *"M. miniatus hellmayri,* Pacific Orange-bellied Redstart" and limits the smaller *connectens* to the mountains of the interior Cordillera of El Salvador and south central Honduras, pointing out that Hellmayr had only two birds from the range of *connectens*, so that the size differences were not apparent. It is unfortunate that my two papers should not agree in nomenclature, but to avoid a more general confusion it seems best to follow van Rossem here.

further attention by their song. Although simple in phrasing, it is loud, clear, and ringing—the most forceful of all the songs of warblers I heard on the Sierra de Tecpán, except only that of the Painted Redstart (*Setophaga picta*).

Nest and eggs. On the afternoon of May 13, 1933, while climbing a steep, wooded slope on the Sierra de Tecpán, beneath fine, old, epiphyte-laden trees, I stumbled over a decaying log and frightened a small, blackish-backed bird from its nest. It flew off so rapidly that I saw it too imperfectly to be able to identify it. The nest was situated on the uphill side of a large depression in the ground, made by the uprooting of a great tree whose massive trunk lay mouldering on the slope below. The tree must have fallen some years earlier, for the sides of the hollow were already well-covered with ferns and mosses, and among these the nest was concealed. The structure consisted of a cup-shaped lower portion and a domed roof. The entrance, in the side facing out from the bank, was not round like that of the nests of other forms of *Myioborus* that I found in later years in Costa Rica, but very much wider than high. The lower cup was composed of dead leaves and fibers, thickly lined with fine fibrous material; but the substantial roof, which seemed to have been added as a separate unit, consisted largely of pine needles, with a few dead leaves of dicotyledonous plants intermixed. The three beautiful eggs that rested on the bottom of the nest were white, heavily speckled with reddish-brown, especially on the thicker end; they measured respectively 17.5 by 13.5, 17.5 by 13.5, and 17.5 by 13.1 millimeters. The tip of a frond of a small fern, rooted higher on the bank, hung prettily over the entrance, partially screening the eggs (Plate 12). Dickey and van Rossem (1938:506) describe a nest of this redstart found in El Salvador, May 17, 1927, which "was in a crevice in a vertical road bank, the site being about three feet above the road level. It was simply a ball of bright green moss which entirely filled the cavity, and the outer surface of the nest was flush with the face of the bank. The entrance was a small hole in the side. The lining was of rather wide strips of what appeared to be soft inner bark. A sheltering curtain of ferns hung down over the nest entrance, and the site was discovered only by watching the parents as they carried food to the young."

I waited till evening was approaching for the bird to come back to the nest, but it seemed reluctant to show itself in my presence. Returning on the following day, I was delighted to find an Orange-bellied Redstart sitting in the domed nest. The bird allowed me to approach almost within reach before it jumped out and flew down the slope, skimming low over the ground. I set up my tent in the depression, not two yards from the nest, for there was no other level spot in the vicinity. I seated myself inside and looked out through the tiny window for the Redstart's return. Promptly re-appearing, the bird fluttered back and forth in front of the nest, apparently not sure whether it would be quite safe to go to

it in the presence of the strange brown object that had so suddenly sprung up there. Many times the Redstart approached the nest and seemed to be on the point of entering but retreated before quite reaching the goal. Finally, 10 minutes after I entered the blind, the bird was warming the eggs once more.

The next step was to mark one of the pair of Redstarts, in order to distinguish male from female with certainty. After the bird's departure from the nest, I stuck upright in the middle of the doorway a fine twig bearing a wad of cotton soaked in white enamel. Once more the bird flew back and forth in front of the nest; sometimes it alighted on a dead branch which projected from the bank just outside the blind, proving thereby that it had already lost all distrust of this strange object. Finally, before many minutes had passed, the Redstart returned to the nest and attempted to slip into it between the little paintbrush and one corner of the wide entrance but brushed lightly against the paint-soaked cotton. This seemed to disturb the bird greatly; it slipped out immediately and at once began to preen the feathers on the left side of the orange breast, where a small spot of white marred the uniform brightness. The mark was hardly conspicuous enough to satisfy me, and the Redstart was doing its best to make it less so; accordingly I left the brush in place so that the bird might make contact with it once more. Although I left it there for more than half an hour, the Redstart did not go near, and finally disappeared with another Redstart, assumed to be the male of the pair, which, during all this time, had not come near the nest but remained at a distance among the trees. Since it was now after five o'clock in the afternoon, I removed the paint-brush and went away, leaving the blind in place for the morrow.

Incubation. The following morning, May 15, in the early dawn, I slipped into the brown wigwam without disturbing the Redstart and passed the greater part of the day watching the nest. The marked bird, evidently the female, alone warmed the eggs. On returning at the end of a recess, she always flew back and forth a number of times in front of the nest, and often made several false starts to enter it. Her hesitation in going to the nest was probably not caused by the presence of the blind, for in these maneuvers she often came very close to it, and many times perched on a dead branch just outside, not two feet from my eyes. Thereby I had ample opportunity to recognize the faint paint mark on her left side, and did so at every return to the nest except three.

The Redstart sat sideways in the nest, with her long tail projecting from one corner of the wide entrance and her head constantly turned outward so that she could view her surroundings. Her bright orange-red breast and belly were concealed beneath her, and the white ends of her outer tail feathers were folded under the uniformly dark central feathers; in the nest, she was far less conspicuous than one would suppose to be possible. During the night and in rainy weather, she sat

with her left wing toward the outside; but during clear days she always sat facing in the opposite direction, with her right wing outward. Since there was little, if any, wind in the deep forest where the nest was situated, I cannot explain this invariable habit. Most of the time she rested nearly motionless, seldom turning her head or adjusting the eggs beneath her; but she was ever alert to slight sounds and looked about to discover their origin. Some minutes before leaving the nest she would become restless, move her head actively, swallow, gape, and shift the eggs; these movements would lead at length to her flying off. As she winged down the mountainside, she invariably called, with sharp, metallic monosyllables very similar to the call of the Cardinal (*Richmondena cardinalis*).

I devoted a total of 12 hours to watching this Redstart incubate. From 5:40 A.M. to 2:26 P.M. on May 15, I kept vigil during weather which was largely cloudy but rainless; while from 2:55 to 6:00 P.M. on May 17 I studied her behavior in a steady, fairly hard rain. Taking the two records together, 11 sessions on the eggs ranged from 26 to 49 minutes, with an average of 37.6 minutes; 12 recesses ranged from 10 to 37 minutes, with an average of 18.2 minutes. She devoted 67.4 per cent of the 12 hours to incubation. I have not included in this record a session of only 18 minutes which was terminated when a jaguarundi cat passed stealthily, only two yards in front of the nest, and frightened the Redstart from her eggs.

It is of interest to compare the Redstart's behavior while incubating in clear weather and in the rain. During the rainy afternoon of May 17, there were two sessions of 42 and 49 minutes, respectively, and two recesses of 37 and 35 minutes. Her sessions on the eggs were not significantly longer than those in clear weather; for early in the rainless afternoon of May 15 she sat continuously for periods of 47, 38, and 45 minutes, while early in the morning she had incubated once for 38 minutes. But her three longest recesses on May 15 were only 22, 16, and 16 minutes; and the average of 10 recesses in rainless weather was only 14.6 minutes. Thus the rain had greatly increased the time she devoted to finding food, but did not increase her period of warming the eggs. This was doubtless because during a hard rain there are few insects upon the wing; and since she subsisted largely upon flying insects, she found it far more difficult to satisfy her hunger.

The male Redstart usually remained at a considerable distance from the nest. His song, when I could hear it at all, sounded from afar in the woods. Twice, however, he accompanied his mate as she returned to her eggs, calling, and singing *ch'ree ch'ree ch'ree ch'ree* in a clear, melodious voice. The female, after she had settled in the nest, answered him with a low murmur. After singing and catching insects for a few minutes in the vicinity of the nest, he flitted off among the trees, and his song grew faint in the distance. Even on these rare visits, he did not approach the nest closely.

Among the brightly colored species of North American wood warblers, the female is usually dull-colored and incubates the eggs without the assistance of the male. In many species of tropical warblers, male and female are equally brilliant in plumage, and I thought that perhaps they would prove to share the duties of the nest. But neither the male Pink-headed Warbler (*Ergaticus versicolor*), nor Hartlaub's Warbler (*Vermivora superciliosa*), nor the Orange-bellied Redstart, ever sat upon the nest. Later in Costa Rica, I found that the male Collared Redstart (*Myioborus torquatus*) and Buff-rumped Warbler (*Basileuterus fulvicauda*) likewise took no share in incubation. My experience with warblers has been duplicated with tanagers, finches, honeycreepers, orioles and other families. With few exceptions, all the members of the same family of birds follow the same general plan of incubating the eggs, and species in which the sexes are alike in color behave very much the same as species in which the sexes are greatly different. Contrary to the statements of theorists of the last century, the color of the plumage seems not to be correlated with incubation habits.

The nestlings and their care. Each day the female Redstart allowed me to come a little closer to her when I visited the nest, until finally I could bend down my head and look in at her from the distance of a foot, before she slipped out and fluttered away, "feigning injury." On May 22, this reaction was much stronger than ever before. Upon jumping from the nest at my near approach, she alighted on the ground only two yards away from me, relaxed and vibrated her wings, and moved as though in great distress. When I took a few steps toward her, she fluttered off ahead of me and alighted on the ground again to repeat the act. She did this a number of times, until I had followed her a good distance from the nest, when of a sudden she "recovered" and flew rapidly down the mountainside. Returning then to her nest, I found one little nestling, with red skin scarcely concealed by sparse gray down. It was remarkable how erect it stood—like a sentinel at his post—as it held up its widely gaping mouth for food. Then, exhausted by the momentary effort, it fell over and lay in the bottom of the nest. The occupants of the other two eggs were tapping at their shells; they hatched the following day, May 23.

The male Redstart, as we have seen, did not show much attention to his mate while she incubated; and while I watched, he never went to look into the nest. As a result, apparently, he had not become familiar with its position, and seemed to experience considerable difficulty in finding it when he first began to feed the nestlings. Just how he learned that they had hatched I do not know, for I did not replace my tent and again watch this nest until the nestling first to hatch was three days old, the other two a day younger. Even then the male seemed to waste much time in locating his children. He would come, singing, with his bill full

of insects, and fly to the wrong part of the bank. Here he would apparently search for the nest, returning again and again to look for it, seeming to be surprised at not finding it where it never had been. Sometimes he spent many minutes exploring various portions of the mossy sides of the depression before he at last came to the actual nest site. On three occasions he flew away, still carrying the food intended for the nestlings. Even after he had fed them several times in my presence, he seemed unsure of their exact location. During the three hours of my vigil that morning, his memory of the nest's position seemed to improve rapidly, until at last he went directly to it as his mate did. She fed the three nestlings 10 times, in the intervals of keeping them warm; but he gave them food only 5 times, and 3 times carried away the food he had brought.

The male Redstart was not at all afraid of my tent, for he flew all around it while searching for his nestlings; but it is possible that the sudden appearance of so large an object less than six feet from the nest confused him. The tent did not in the least disturb the female, although eight days had passed since she had last seen it.

One of the nestling Redstarts vanished when a few days old, and only two lived to leave the nest. They took their departure on June 2 and 3 respectively, at the age of about 11 days, when they were scarcely able to fly, and could only hop rapidly over the ground. Since I had removed them from the nest to examine their plumage, it is likely that they left somewhat prematurely. Their upper plumage, head, throat, and a portion of the breast were sooty gray. The lower part of the breast and the belly were buff, very different from the glowing color of their parents, and they lacked the chestnut crown.

By late July, before their parents have ceased to give them food, young Orange-bellied Redstarts have molted into a plumage difficult to distinguish from that of the adults. As soon as the young are able to take care of themselves, the families break up.

In the separation of male and female after the breeding season, the Pacific differs strikingly from the Costa Rican Orange-bellied Redstart and from the Collared Redstart. Although they sang far less than they had during the fine weather of April and May, the males sang occasionally on pleasant days through most of the rainy season, which extended from mid-May to mid-October. During this period, I heard their song far more often than that of any other wood warbler on the Sierra de Tecpán; but it was not so loud and clear as it had been during the nesting season. If two males happened to come together in the same mixed flock, they sang spiritedly against each other, and finally one would drive the other out of the flock.

Costa Rican Orange-bellied Redstart

The Costa Rican Orange-bellied Redstart (*Myioborus miniatus aurantiacus*) is confined to Costa Rica, but closely similar forms are

widespread in the mountains of northern and western South America. It is found only at middle altitudes. Carriker (1910:800) gives its altitudinal range as 2,000 to 7,000 feet above sea-level, but it must be very rare at 2,000 feet, for on the Caribbean slope I have never met it below 3,000 feet, and seldom even at this altitude. On the Pacific slope, I have not encountered the bird below 3,700 feet.

Appearance and habits. In plumage and habits, this Redstart is the southern counterpart of the Pacific Orange-bellied Redstart. It has the same dark slate-colored upper plumage, wings and tail, the same chestnut crown and white outer tail feathers; but the breast and belly are cadmium yellow, instead of orange-red as in the northern bird.

In the vicinity of Vara Blanca, on the northern slope of the Cordillera Central of Costa Rica, I found these redstarts very numerous between 5,000 and 6,000 feet above sea-level. Here they dwelt in the humid, moss-draped cloud-forest, but they usually avoided its darker depths and were most often seen along its bushy edges, whence they ventured forth among the scattered trees and shrubs of the adjoining fields and pastures. Yet they rarely wandered far from the woodland and the heavier second-growth thickets. They remained mated through the year. The young birds appeared to find partners a few months after they were fledged; after October I nearly always saw these redstarts in pairs. In the eastern foothills of the Ecuadorean Andes, in August and September when they were apparently not nesting, I found the related race, *Myioborus miniatus pallidiventris,* living in pairs or alone.

The Costa Rican Orange-bellied Redstart hunts among the branches of the trees less than the Pacific; it forages far more frequently among the bushes along the margin of the forest, often quite near the ground, where it sometimes alights to pick up an insect. It rarely ascends to the tops of the higher trees. It has the same sprightly, active ways as the other redstarts, and catches much of its insect food upon the wing, making short sallies out from the bushes, frequently doubling and twisting through the air in an intricate course. It is, as a rule, somewhat less spectacular in its movements than the Pacific Orange-bellied Redstart or the American Redstart (*Setophaga ruticilla*), probably because it forages so much among low bushes, often in close, tangled vegetation, rather than in the more open crowns of trees. Sometimes, as it flits about in search of insects, it spreads its tail fanwise, displaying the white outer feathers in pretty contrast to the dark central tail feathers and upper plumage. Like the Pacific Orange-bellied Redstart, it sometimes searches over the bark of trees. One April morning at dawn, I watched a male ascend the clean, smooth trunk of a medium-sized tree, searching for insects as he went. He clung to the bark, then flitted up a short distance and clung again, repeating this until he reached the branches above. Here he flitted about, his wings drooping when not in use, his tail prettily spread, and sang his sweet, homely song.

The Redstarts' almost exclusively insect diet is from time to time varied with the little white protein bodies which they pluck from the brown hairy cushions at the bases of the long petioles of the great leaves of the cecropia trees. These ovoid corpuscles, the size of a mustard seed, are the chief food of the azteca ants that make their homes in the hollow stems and branches of the trees; but when the ants are absent, as is often true at higher altitudes in the subtropical zone, the corpuscles accumulate in numbers and are eaten by small birds—wintering warblers of several kinds, small finches, honey-creepers, and ovenbirds, as well as redstarts.

Song. The song of the Orange-bellied Redstart of Costa Rica is simple; it is pleasant but neither strong nor ringing in tone: *chee chee chee chee chee chee,* the notes rising slightly in pitch toward the end. His notes are far less full and rich than those of the Pacific Orange-bellied, the Collared, or the Painted Redstart; his phrasing is less varied than that of the Collared Redstart and the American Redstart. But he does not restrict his singing to the season of courtship and nesting; he is heard in pleasant weather in every month of the year, although more rarely during the gloomy period from October to January. The call of this redstart is a weak *chip.*

Nest building. In 1938, I found the first nest of the Costa Rican Orange-bellied Redstart on March 30, when it was nearly completed. It was in a niche six feet above the base of a cut-bank eight feet high, beside a muddy mountain road along which many people passed. The little pocket in the clay wall was just big enough to contain the nest, and the site was further shielded from the elements by an overhang of root-bound earth at the top of the bank. Yet the nest, composed principally of straws, dry grass-blades and fibrous rootlets, was a roofed structure, with a round doorway in the side that faced out from the bank; and moreover, the roof had been made very thick. It may have served to shield the interior of the nest from falling particles of earth if not from the rain. The side walls were still thin, and one could see the earth of the bank through the right side of the nest. The floor of the nest, as is usual in such structures, had been left until the last; when I first looked in, the earthen bottom of the niche had not been covered over. It was to the covering and lining of the bottom that the builder devoted most attention while I watched on the morning of March 30.

Since the Redstart was too cautious to go to her nest while I stood in the roadway, in order to watch her at work I was obliged to screen myself within the border of high grass in the pasture below the road. Later, when she had become somewhat accustomed to her observer, I moved closer and stood behind a small cypress tree that had been planted beside the road. I watched for two hours, from 8:00 to 10:00 o'clock; during this period the female warbler brought material to the

nest 54 times. She picked up straws, grass blades, and other fine bits of vegetation from the road and the slope above the bank, and she sometimes tried to pull exposed slender rootlets from the bank, though usually without success. Later in the morning, when she had begun to line the nest, she brought, from the woods that began a short distance back from the top of the bank, bundles of fine brown fibers, of whose origin I remained in ignorance. She also visited a thick stump, overgrown with epiphytic bushes, ferns, and mosses, which stood at the edge of the road close beside me, vanishing into its cavities and fern-shaded recesses, to re-appear with her bill full of thread-like rootlets. She was usually cautious in approaching her nest, and perched upon some fallen brush beside the bank to look about her before she entered.

At this nest the male Redstart did not help with the work of building. Most of the time while his mate worked, he remained among the bushes on the slope above the nest, where he hunted insects and often sang. From time to time he came to perch upon a slender dead stem that projected from the bank a few feet from the nest. Here he sometimes sang but mostly rested in silence. At times he hovered in front of the nest to look in; and once, while his mate was within, arranging the material that she had brought, he came to stand upon the sill of the doorway. The female evidently did not approve of this visit, for she opened her bill in a threatening attitude.

On April 1, I found another nest being built in a very different sort of position. It was on the ground on a very steep slope in a bean-patch overgrown with low weeds, about 30 feet from the edge of the forest. It occupied a slight depression in the slope, and the sill of the entrance was just level with the ground in front. The fronds of a small fern, growing above the nest, bent prettily over the domed roof; it was screened in front by a seedling cecropia tree, and on the sides by tufts of grass. The slender trunk of a fallen tree, bridging the cavity in the hillside, stretched above the nest, helping to conceal and shelter it. The nest itself resembled the first that I found; it was entirely enclosed except for the round doorway in the side facing down the slope. The walls, roof, and cupped bottom were all quite thick; they were composed of soft, fibrous vegetable materials, with some decaying grass blades intermixed. The nest was nearly finished.

The male and female Redstarts were building this nest together. Since I could not distinguish them by appearance, and the male sang very little, and not at all while he worked, I was not able to determine the relative part taken by each sex in building. The two made no attempt to come and go together as tanagers of many kinds do; each went its way independently of the other. Yet despite this lack of coordination in their movements, on 10 occasions during the course of the hour and a half between 9:00 and 10:30 o'clock, I had proof that both birds worked at the nest, since I saw the second fly up to it with material in its bill, before the first, which had already added its contri-

bution to the structure, had left the clearing. Thus it was evident that both male and female took substantial parts in the labor of building. This was the first time that I had seen a male wood warbler of any kind help build a nest.

Among other things, the birds upon several occasions brought billfuls of the brown ramenta of a fern to their nest. I saw one of them pull the big, crowded scales from the bases of the great, thick, spine-studded petioles of the spreading fronds of a tall tree-fern that grew at the edge of the neighboring forest. While I watched these redstarts build their nest, I sat at the base of a tree on the slope above them, in plain view and at no great distance. At first, the birds, upon arriving with material in their bills, flitted about in the offing and hesitated to approach their nest, but soon they grew accustomed to my presence and went about their labors without fear.

The third nest at which I watched these Orange-bellied Redstarts work occupied a site quite different from those of the first two. A small fallen log, densely covered with slender aroids, ferns, mosses, and other epiphytic growths, lay in a pasture about 10 feet from the edge of the forest. The nest was built upon the log, and fitted snugly into a nook beneath the stems and roots of epiphytes; it was completely covered over by a thick layer of moss. The round entrance was screened by a bromeliad and the foliage of several small epiphytic shrubs. On the morning of April 5, after the cessation of the rain, I watched this nest from 9:15 to 10:15. It appeared to be finished, but the industrious builder continued to augment the already ample lining. During the course of the hour, she took material to the nest 15 times. Her mate flitted about in the vicinity, catching insects and often singing; but I saw nothing to suggest that he helped to build.

Two days earlier, I had watched yet another nest, whose builder, shier than most of her kind, would not go to her work in my presence. Here, too, I saw nothing to suggest that the male would have helped his mate to build. Quite a number of times I saw one of the pair flitting about with material in its bill, hesitating to approach the nest, but never two birds together with material. (When both members of a pair of birds build the nest, yet do not come to it together, sometimes the best way to prove that they both work is to delay their approach to the structure by standing near it and preventing the deposit of material until both have arrived with laden bills.) The following day, I spent a short while at a fourth nest, again without finding any evidence that the male helped to build. The male Redstart that took so large a share in the construction of the nest in the bean-field was evidently exceptional in his species, as he was among wood warblers in general. I wanted very much to see whether he would take an abnormal part in the subsequent duties of the nest, but unhappily it was prematurely destroyed.

The male Buff-rumped Warbler (*Basileuterus fulvicauda*) regularly takes a large share in building. I have seen a male do so at four nests.

But nest-construction by male wood warblers has only rarely been recorded; and aside from the single Costa Rican Orange-bellied Redstart and the Buff-rumped Warblers, I have never myself seen a male at work. It is possible that at the other redstart nests I watched, the male helped to build at other stages of construction, but I do not think this likely.

We have already called attention to a considerable variation in the Redstarts' nest sites: niches in cut-banks; a slight depression on a very steep slope, among sheltering vegetation; a fallen log amid low, dense epiphytic growth. But a cranny in a bank appeared to be the most favored location; 11 of the 14 nests I found in 1938 were so situated. The cottage that I occupied at Vara Blanca stood amid pastures which covered the back of a narrow ridge falling away steeply on three sides to wooded ravines or gorges. On the western side of the pasture, a footpath followed along the side of the ridge for a distance of about a quarter of a mile. Along much of its length, this path had been cut into the steep slope, making a bank, in places three or four feet high, that faced the bushy border of the woods across the path and had the grassy hillside rising behind it. This low bank, in places covered by grasses creeping down from above, in others overgrown with ferns and small native herbs, was a favorite nesting site of the Orange-bellied Redstarts. In this one long bank, eight of their nests were built between the end of March and late May. Most were well-screened by surrounding vegetation. They were well-separated, although one was only 29 feet from an occupied nest of the Collared Redstart.

I did not have the good fortune to witness the very beginning of nest building in any instance, but from the examination of completed nests I learned something about the earliest stages of construction. After the selection of the nest site, the Redstart's first care was to carry into the cavity fairly large dead leaves to serve, apparently, as a foundation for the nest. These leaves included the foliage of dicotyledonous plants and bamboos, and fragments of the fronds of ferns. Some measured as much as six inches in length. Often a number were strewn in front of the nest site, whether intentionally or by accident I cannot say. From the ground in front of one of the nests, I picked up a double handful of dead leaves which obviously had not merely fallen from neighboring trees. I found a number of niches in banks, such as might have been selected by the Redstarts for their nests, which contained a small accumulation of dead leaves, mixed at times with some straws and the like, all of which appeared to have been quite recently placed there. Apparently the Redstarts had prepared to build in these crannies but afterwards abandoned them in favor of other sites that pleased them better. Some of the pockets that contained completed nests were lined all around with dry bamboo leaves; in others, this lining was confined to the sides and bottom. The Collared Redstart likewise builds its nest upon a foundation of broad dead leaves.

The nest beside the main trail, which I had watched as the bird built on March 30, was found lying in the roadway on the following day. On April 2, this bird had a half-finished nest only four inches from the site of her first. By the afternoon of April 3, the new structure appeared to be finished, after three (or at most four) days of work—only to meet the same fate as its predecessor. Another nest, found on April 2 when newly begun, appeared complete by April 5. A late nest was found in an early stage of construction on May 19 and seemed to be finished on May 23. Accordingly, these redstarts build their roofed nests in from three to five days.

The eggs. Despite the speed with which these rather bulky nests were constructed, about a week elapsed between the completion of the work and the laying of the first egg. This long period between the end of active building and the appearance of the first egg was noted at all seven of the early nests for which information is available. But a late nest (evidently a replacement), found under construction on May 19, was completed about May 23, and contained the first egg on May 25 (See Table 1).

The Orange-bellied Redstarts at Vara Blanca generally began to build their nests during the last days of March or the beginning of April. The earliest egg was found on April 7 (Nest 7). In nine nests, the first egg was laid during the week from April 7 to 13, inclusive. (Nest 10 is included in this number, from the calculated date of laying.) The three nests found with eggs in May were probably all replacements of earlier nests that had been lost. This close synchronization in the time of laying is surprising in a bird that dwells throughout the year in a region without marked seasonal variations in climate; yet it is paralleled, in my experience, in several other kinds of tropical birds. At Vara Blanca I kept only rough notes on the weather and took records of maximum and minimum temperatures with a Six's thermometer that was probably not very accurate. During the period of my residence there, July 1937 to August 1938, the only pronounced seasonal difference in weather was that the rain storms during the period from February to August were less protracted and severe than they had been during the preceding seven months. But during April, May, and June, when the great majority of the birds were nesting, there was much cloudiness and rain, and a dearth of sunshine.

The eggs were laid early in the morning—I have four records of eggs laid before 7:30 A.M.—and at intervals of one day. Eleven nests contained each three eggs or nestlings; two contained two eggs each. The eggs were white or dull white, speckled and blotched with brown ranging from bright brown to chocolate. The pigmentation was heaviest in a wreath at the point of greatest transverse diameter, or in a cap covering the larger end. The remaining surface was more lightly spotted

with the same color, the heaviness of the pigmentation varying considerably in different sets. Measurement of 20 eggs gave an average of 17.5 by 13.4 millimeters. The eggs showing the four extremes measured 18.3 by 13.9, 16.7 by 13.5 and 17.5 by 13.1 millimeters. Six eggs showed the minimum diameter of 13.1 millimeters.

Incubation apparently began with the laying of the last egg of the set. The fact that in all six nests for which information is available the eggs in a set all hatched within a period of approximately 24 hours, suggests that the Redstarts incubated little before their sets were complete. The nest that I most wanted to watch during the period of incubation—that which the male had helped to build—was prematurely destroyed; and the others seemed less important to study during this period than those of some other species of birds that then claimed my attention. It is almost certain that the female incubates without help from her mate, as in all other wood warblers for which I have information, including the related Pacific Orange-bellied Redstart and the Collared Redstart.

The incubation period varied from 13 to 15 days. Three eggs in one nest hatched 13 days after the set was completed and incubation presumably begun; three eggs in one nest hatched in fourteen days; nine eggs in four nests hatched in fifteen days. The eggs of the non-migratory Central American warblers seem generally to require a few days more incubation than those of the migratory species that breed in temperate North America. I have one record for the Collared Redstart: 15 days; one for the Pink-headed Warbler (*Ergaticus versicolor*): 16 days; seven records for the Buff-rumped Warbler: 16, 17 and (abnormally: one record) 19 days. The eggs of most North American warblers hatch after only 11 or 12 days of incubation.

The nestlings. The newly hatched Redstarts were pink-skinned and blind, and sparsely covered with down. At the age of 9 or 10 days, they were well-clothed with feathers, and after the age of 10 or 11 days, they were no longer brooded during the night. They left the nest when from 12 to 14 days of age. Six nestlings in three nests left at the age of 12 days; two in one nest, at the age of 14 days. I handled none of these nestlings after they began to be feathered, and the departures of all were probably spontaneous. At one nest (No. 11), however, I removed two nine-day-old nestlings for examination of their under plumage, which I could not otherwise see. As I lifted one from the nest, the other tried to jump out. When I had completed my notes on the plumage, I returned both young to the nest and induced them to remain there, at least until I was out of sight. But the following day the nest was empty. The nestling period of these young that had been handled was accordingly only 10 days, as compared with the 12 to 14 days of undisturbed young Redstarts.

Reproductive success. Tables 1 and 2 give the data for the 14 nests whose history is adequately known (including two replacements at the sites of earlier nests that had been despoiled). Of the 31 eggs laid, 10, or 32 per cent produced fledglings; of the 11 nests that contained these eggs, 5, or 45 per cent produced at least one fledgling. In my experience, this is about average success in reproduction among Central American birds—rather better than one would expect in the lowlands, not so good as might be found at still higher altitudes.

TABLE 1

SYNOPTIC HISTORY OF 14 NESTS OF COSTA RICAN ORANGE-BELLIED REDSTARTS
Vara Blanca de Sarapiquí, Costa Rica, 5,300–5,600 feet
March–June, 1938

Nest 1—Building March 30; destroyed by man, March 31.

Nest 1a—Building 4 inches from Nest 1, April 2; apparently completed, April 3; destroyed by man, April 6.

Nest 2—Building April 1; 3 eggs laid April 8, 9, and (presumably) 10; eggs broken and eaten, April 16.

Nest 3—Begun about April 2; apparently completed April 5; 3 eggs laid April 12, 13, and 14; 3 nestlings April 28 (14 days incubation); all dead in nest May 4.

Nest 3a—Found completed, resting on Nest 3, June 7; apparently never contained eggs.

Nest 4—Nearly completed, April 4; 3 eggs laid April 12, 13, and 14; eggs broken and eaten, April 28.

Nest 5—Nearly completed, April 4; 3 eggs laid April 12, 13, and 14; 3 nestlings, April 27 (13 days incubation); nestlings disappeared, May 4, 5.

Nest 6—Apparently completed, April 2; 3 eggs laid April 8, 9, and 10; 2 nestlings, April 25 (15 days incubation); nestlings departed May 9 (14 days old).

Nest 7—Found with 1 egg, April 7; second egg laid April 8; 2 nestlings, April 23 (15 days incubation); nestlings departed, May 5 (12 days old).

Nest 8—Apparently completed, April 6; 3 eggs laid April 13, 14, and (presumably) 15; eggs disappeared, April 18.

Nest 9—Apparently completed, April 7; 3 eggs laid April 13 to 15; 3 nestlings hatched April 30 (15 days incubation); nestlings departed May 12 (12 days old).

Nest 10—Found with 3 nestlings a few days old, April 27. Subsequent history unknown.

Nest 11—Found with 2 eggs, May 4; 2 nestlings hatched May 16; nestlings departed May 26 (10 days old—had been removed for examination).

Nest 12—Found with 3 eggs, May 4; one nestling hatched May 13 (other 2 eggs infertile); nestling departed May 25 (12 days old).

Nest 13—Found with 3 nestlings in pin-feathers, May 8; nestlings well feathered, May 16.

Nest 14—Building May 19; nest completed, May 23; 3 eggs laid May 25, 26, and 27; 2 nestlings hatched June 11 (15 days incubation); nestlings disappeared June 18. (Near site of Nest 2 and probably belonged to same pair.)

TABLE 2

REPRODUCTIVE SUCCESS OF THE COSTA RICAN ORANGE-BELLIED REDSTART *

	Nest	Eggs				Nestlings	
		No. laid	De-stroyed	Not hatched	Hatched	Died or lost	Left nest
	1	0	—	—	—	—	—
	1a	0	—	—	—	—	—
	2	3	3	—	—	—	—
	3	3	0	0	3	3	0
	3a	0	—	—	—	—	—
	4	3	3	—	—	—	—
	5	3	0	0	3	3	0
	6	3	0	1	2	0	2
	7	2	0	0	2	0	2
	8	3	3	—	—	—	—
	9	3	0	0	3	0	3
	11	2	-	0	2	0	2
	12	3	0	2	1	0	1
	14	3	0	1	2	2	0
Totals		31 100%	9 29%	4 13%	18 58%	8 26%	10 32%
Totals by nests		11 100%	3 27%	3 27%	8 73%	3 27%	5 45%

* Based on the nests listed in Table 1. Nests 10 and 13, whose history is unknown, are omitted.

Absence of a second brood. I continued field work in the same locality until the middle of August, but found no evidence of a second brood. The one nest whose dates suggest a second brood (No. 14) was near the site of an earlier nest from which the eggs had been lost. Wood warblers in general appear to raise only one brood in a year; in this, the species of the Central American highlands agree, so far as we know, with those that breed in the North. At lower altitudes in Costa Rica, the Buff-rumped Warbler breeds from March to August, a period long enough for two or even three broods; but I am not at all sure that the late nests are not merely repeated attempts at reproduction by birds which have earlier been unsuccessful in fledging their young.

"Injury-feigning" or distraction display. Sometimes, when interrupted while incubating their eggs or brooding their nestlings, these Costa Rican Orange-bellied Redstarts would "feign injury" in front of the nest. Since I passed almost every day, and often several times a day, along the path beside which most of these nests were situated, I enjoyed an excellent opportunity to witness these "distraction displays" and to learn something of the circumstances under which they took place. Other things being equal, whether or not a bird "feigns injury" often depends upon whether it finds a suitably clear area in which to perform; for although it has been claimed that birds are hysterical, or half-crazed, or otherwise not in full control of their faculties when they behave in this manner, they are usually sufficiently in possession of their wits not to beat their wings and flap about amid dense vegetation where there is danger of their becoming entangled and falling an easy prey to their enemies. Since all of these redstarts had, in the clear pathway in front of their nests, a suitable stage upon which to act, variations in behavior might be attributed to individual differences among the birds rather than to the varying nature of the surrounding area.

Of the eight Orange-bellied Redstarts that nested in the bank beside the path, three were never seen to make any special display upon leaving the nest. Two of these successfully reared fledglings, but the third lost her eggs when they were on the point of hatching. The remaining five varied considerably as to the stage of the nesting at which they displayed. The female of Nest 6 feigned injury soon after she began to incubate, but not thereafter, although she successfully reared her nestlings. The owner of Nest 8 gave an excellent performance the day after she began to incubate. (Two days later she lost her eggs.) The Redstart of Nest 11 displayed nine days before her eggs hatched. At Nest 7, the female feigned injury only on the day her eggs hatched. At Nest 3, the performance was witnessed three days before hatching, on the day the eggs hatched, and when the nestlings were two days old. Even in a single day, the same bird did not consistently feign injury when driven from the nest. Possibly this depended upon how long she had been sitting before she was interrupted. (See Pickwell, in Bent 1942:349.)

Usually the Redstarts sat bravely, permitting me to approach very close to them before they left the nest. Some would allow me almost to touch them; others would sit steadfast and return my gaze with eyes only a hand's breadth from my own. But a closer approach would cause them to dart past me and fly toward the neighboring woods. There was no relationship between the closeness of the bird's sitting and her display upon leaving; some of the Redstarts that would allow me to come within a few inches of touching them never displayed. Those birds that attempted to lure me from the nest by the "distraction display" usually dropped from their nests into the pathway almost at my feet, where they vibrated their relaxed wings and moved slowly, as though in-

jured, toward the bushes on the farther side. Others would flit directly from the nest to the vegetation at the edge of the neighboring forest, where they raised and fluttered their wings, depressed their tail, and hopped mincingly from stem to stem, always keeping near the ground. Sometimes, after passing from view among the foliage, they would return to the edge and continue to perform where they caught my eye. Such behavior certainly seemed purposive, and not merely a substitute reaction.

The fledglings. When they left the nest, the young Redstarts wore a plumage very much duller than that of the adults. The head was dingy black, with no chestnut on the crown. The upper plumage, throat, and chest were dark slate-color. The lower breast and belly were buff. The outer tail feathers were white, as in the adults. This body plumage was worn only for a brief period; soon after beginning to fly, the young birds started to acquire the colors of the adults. The last remaining mark of immaturity was the dull black crown; but by mid-July, some individuals had chestnut feathers on their heads. Soon there was little difference between the adults and the young of the year. By October the young birds, now indistinguishable from the adults, appeared to have mated; for most redstarts of this subspecies were then in pairs.

Collared Redstart

The charming Collared Redstart (*Myioborus torquatus*) is confined to the mossy, humid forests of the southern highlands of Central America—in Costa Rica and western Panamá. It is the biggest and to my mind the prettiest of the Central American members of this attractive genus. Its upper plumage is black or blackish, and it has the chestnut crown-patch characteristic of the group. Its forehead, face, throat, and all the under parts are bright yellow, with a black band or collar extending across the breast, joining the black of the upper plumage. Its long tail is black, with snowy white outer feathers. Its bill and eyes are black. The sexes are alike.

Habits. Carriker (1910:799) states that in Costa Rica the Collared Redstart ranges from about 3,500 feet above sea-level up to timberline on the high volcanoes. Hence it extends considerably higher than the Orange-bellied Redstart of Costa Rica, although their two ranges overlap over a wide area. I found it very abundant on the storm-beaten northern slopes of the Cordillera Central between 5,000 and 8,000 feet above sea-level. Although essentially a sylvan bird, it frequents the bushy woodland edges, and such openings as are made by roadways or the fall of some giant tree, rather than the dark depths of the unbroken mountain forest. Sprightly, graceful, and restlessly active, it hunts its insect food at all levels from the tree-tops to the ground, yet is most often seen at middle heights. It searches over the bark of trees far more seldom than the two forms of Orange-bellied Redstart described

above, but like them, it frequently catches insects on the wing. Sometimes, in the lower parts of their altitudinal range, Collared Redstarts in pairs will be found following the army ants in company with a variety of other small woodland birds. They concentrate chiefly upon the capture of such winged fugitives from the ant horde as they can snatch in the air; and their bright colors and active habits make them the most conspicuous figures in all the motley flock.

Unlike the American Redstart, Painted Redstart, and Pacific Orange-bellied Redstart, the Collared Redstart rarely lives alone during the winter months. After the separation of the young birds from their parents, which usually occurs in August or September, Collared Redstarts are most often seen in pairs. Yet even in November and December, it is not rare to find from three to five birds together.

In the wilder portions of the Costa Rican highlands, most birds are as fearless of the human presence as one will find them anywhere save on uninhabited oceanic islands. But the Collared Redstart is the most friendly of all. Sometimes, while I watched them, one of these warblers would alight on a branch so close in front of me that I might have reached out and touched it. One afternoon, while I squatted beside a wren's nest in a bushy opening in the forest, I was surrounded by a family of Collared Redstarts, consisting of parents and young already in the adult dress. Of a sudden, one of the young birds flew up to me and stood on the crown of my hat where, possibly, it had espied an insect. I remained motionless, and it lingered upon my head for several seconds, then flitted off again. At their nests, too, I found the Collared Redstarts almost fearless of me. Because of its trustful ways, the Costa Rican mountaineers sometimes call this bird *el amigo del hombre*, the friend of man.

Song. Not only is the Collared Redstart the brightest in plumage of the three forms of *Myioborus* discussed here, it is also the most gifted singer. Its delightful song is long-continued, full and mellow in tone, varied in phrasing, and easily distinguished from the simpler music of the other redstarts that I have heard. It is both longer and more powerful than the simple notes of the Orange-bellied Redstart of Costa Rica. It is far longer and more varied than the songs of the Pacific Orange-bellied and the Painted Redstarts; although it perhaps equals the former in richness of tone, it falls somewhat short—if memory is to be trusted—of the latter's strong full voice. The Collared Redstart is a notable songster among all the wood warblers. During my year at Vara Blanca, I heard it very rarely from July to February; during this period it sang far less than its neighbor, the Orange-bellied Redstart. But in March, as the breeding season approached, it entered its period of full song and was a joy to hear.

The call note of the Collared Redstart is a sharp monosyllable, *pit*, similar to the *chip* of the Orange-bellied Redstart, but distinctly sharper.

Nest building. At Vara Blanca, on the northern slope of the Cordillera Central of Costa Rica, the Collared Redstarts, although by no means rare between 5,000 and 6,000 feet above sea-level, were far less abundant than the Orange-bellied Redstarts. In 1938, I found 14 nests of the Orange-bellied but only two completed nests of the Collared. Since the two species placed their nests in similar situations, and these were accordingly equally easy to find, the number of nests discovered is probably a good index of the relative abundance in the study area of the two kinds of redstarts.

The first Collared Redstart's nest was found on April 3 when already nearly completed. It was situated in a deep recess in a vertical cut-bank beside a little-used pathway. Above the bank was a pasture with scattered trees and clumps of low, spiny palms; below the path was forest, with tangled undergrowth, falling away into a ravine. The bank was 4 feet high; the niche which sheltered the nest, 40 inches above its foot. The nest was a roofed structure with a round entrance in the side facing out from the bank. It resembled the nests of the other Central American forms of *Myioborus,* but had a thinner roof. The foundation was composed of dry bamboo leaves, others of which lay loosely in front of the doorway. The chief material of the structure was fine vegetable fibers, which in the floor and lower part of the walls were matted together to form a thick, soft fabric. The liverworts, mosses, and low herbage on the walls and about the entrance of the niche in the bank quite screened the nest from the casual glance. Two feet distant, in a more shallow cranny in this bank, was an old nest of the same kind, possibly the preceding year's nest of the same pair. Twenty-nine feet to the north, a Costa Rican Orange-bellied Redstart was building her nest in the same bank.

I sat without concealment in the path north of the Orange-bellied Redstart's nest, hoping to watch both kinds of warbler build at the same time. The Collared Redstart, whose nest was 70 feet away, went ahead with her work as though I were not there; but the Orange-bellied Redstart, whose nest was only 40 feet distant from me, feared to approach it. I made trial of various positions, and learned that the Collared Redstart was not afraid of me even when I sat within 14 feet of her nest; but the Orange-bellied Redstart continued to be shy when I was 15 yards from hers. This agreed with my earlier experience that the Orange-bellied Redstart is consistently less confiding than the Collared Redstart. Since I could find no position that gave a satisfactory view of both nests, and yet did not disturb the more wary bird, I sat with my back to the Orange-bellied Redstart and gave my attention wholly to her trustful neighbor.

At 8:00 o'clock, when I began to watch the Collared Redstart at her building, a fine drizzle was falling from the clouds that swept low above the open pasture and drifted through the tops of the trees in the neighboring forest, whence fell larger drops of moisture that had condensed

on the foliage. From time to time the precipitation increased to the intensity of a light shower; and by 9:45, the rain had become hard enough to drive me to shelter. Yet despite the unfavorable weather, the Redstart kept steadily at her work. During the 105 minutes of my watch, she brought 34 billfuls of material to her nest. She found all of this material in the woods down the slope, and would arrive at the bushy edge of the woodland with her bill laden with an ample bundle of fine, light-colored bast fibers, or the brown ramenta from a fern frond. Then, after a moment's pause, she would flit across the path and come to rest on the top of the bank near her nest. Here she delayed a few seconds more, then flew out and hovered, facing the bank, and finally darted into the nest. In the deep niche she was invisible to me while she worked. Upon emerging, she sometimes rested a few moments on top of the bank; but at other times she flew directly down into the woods.

The male Redstart often followed his mate on her trips to and from the nest. Sometimes he waited at the edge of the woods while she went into the niche, but frequently he crossed the path and rested on the herbage at the top of the bank while she arranged the material. Occasionally he sang here; but more often I heard his beautiful song coming out of the woods, where I could not see him. He never brought any material to the nest.

Although I watched from a point only five yards from the nest, while sitting in the pathway without the slightest concealment, the Collared Redstarts appeared to be perfectly indifferent to my presence. When I was ready to go, I rose and stood in the path only seven feet from the nest, directly in front of it. While I waited in this position, the female arrived at the edge of the woods with her bill full of the big, brown ramenta of a fern, almost the color of her crown. After a little hesitation, she flew into the nest to deposit her burden.

I found two other nests of the Collared Redstart during April in the neighboring pasture. The first was newly begun when discovered, on April 6, in the midst of the odorous calinguero grass (*Melinis minutiflora*) on a steep slope. The bird had chosen as her nest-site a little hollow in the hillside, beside a large clod of earth, and beneath the overhanging stems of the grass growing higher up the slope. Her first step in building was to lay as a foundation a number of dry bamboo leaves, which she carried up from the edge of the woods about a hundred feet down the hillside. This nest was still not quite completed by April 18, and four days later I found it partially destroyed.

On April 24, I found another Collared Redstart building a nest beneath a decaying log, amid fallen brush in the pasture, also about a hundred feet from the edge of the forest. This nest was placed upon the sunken remains of another of the same kind, which raised it a few inches above the earth. A number of dead leaves of dicotyledonous plants, brought by the Redstart, littered the ground in front of the nest. As

with the Orange-bellied Redstart, the first step in building appears to be the collection of broad, dry leaves, and many are dropped a few inches short of the nest-site. This nest appeared to be completed by April 26, contained one egg on April 30, and two—the full set—on May 1. On May 8, I found that the nest had been torn from its nook beneath the log, and the eggs had vanished. An examination of the ruins revealed that the structure had been composed of fine, light-colored bast fibers; shreds of plant epidermis; long, black fibrous roots; and large, brown ramenta of tree-ferns—all in considerable quantities. Since these two nests were prematurely destroyed, we must depend for our study of the later stages of nesting on the first, in the bank beside the path at the edge of the woods.

The eggs. On April 4, the day after I watched in the rain while she carried material into the deep recess in the bank, the female Redstart continued to add to the lining of her nest, but it appeared to be practically completed. Still, the first egg was not laid until April 10; two more were laid on the succeeding days. The three eggs were white, sprinkled all over with light brown; but the dots of color were most concentrated in a wreath about the large end. The eggs measured 19.1 by 13.5, 19.1 by 13.5 and 18.7 by 13.5 millimeters. The eggs in another set found later were similar in coloration but somewhat shorter, both measuring 18.3 by 13.5 millimeters.

Incubation. The female Redstart began to incubate on April 12, the day her set of three eggs was completed. She was already much attached to her nest and would not fly out when I stood directly in front of it. Four days later she sat so closely that I might have caught her in the niche had I cared to do so. She would allow me to look in at her with my face only a few inches from the front of the recess in the bank.

Despite the Redstart's great fearlessness, to study her mode of incubation I decided to watch from a blind; for I wished to feel quite certain that the pair would be in no wise constrained by my presence. Seated in my brown wigwam placed in the pathway a short distance from the nest, I made a continuous record of events there from 5:30 to 10:50 on the morning of April 23, 11 days after incubation had begun. The female alone incubated the eggs, and she was extraordinarily regular in her comings and goings. The eight sessions in the nest which I timed varied only from 27 to 30 minutes, with an average of 28.5 minutes. The eight recesses from incubation ranged from 7 to 13 minutes, with an average of 9.8. The Redstart sat always sideways in the nest, usually with her left side outward. Her long tail projected through the doorway at one side, while her head was turned to look out through the opposite extremity of the opening.

While I watched, the male did not once come near the nest, nor even show himself in the pathway. From time to time, but not very often, I

heard his song coming out of the forest down the slope. I only once saw him accompany the female as she returned to the nest, and then only as far as the edge of the woods.

On the morning of April 24, the female Redstart sat, as was her custom, until I put my hand to the entrance of the niche. Then she slipped past it, fell to the ground at my feet, slightly lifted the tips of her wings and waved them as though helpless. She crept over the ground to the edge of the woods, still quivering her wings, then hopped slowly about, low among the bushes, continuing to vibrate her uplifted wings. This was the first time that she had used the distraction display in my presence—12 days after she had begun to incubate. On the next two days she behaved in the same fashion when I made her leave the nest because I wanted to see whether the eggs had hatched. The eggs were pipped on April 26, and hatched the following day. The female Redstart again gave an excellent "injury-feigning" display on April 30; but after that I saw no further repetition of the performance. Her use of this display was restricted to the period extending from three days before to three days after the eggs hatched.

The three eggs hatched on April 27. Since the last had been laid, and incubation begun, on April 12, the incubation period was 15 days.

The young. The nestling Redstarts had the pink skin and sparse natal down of other newly hatched wood warblers. On April 30, I found one of the three-day-old nestlings lying dead in the niche a few inches in front of the nest. It appeared to be well fed and probably had been accidentally brushed out of the nest by its mother as she departed—a mishap by no means rare among small birds. By May 7, when 10 days old, the two surviving Redstarts were well feathered. They were brooded by their mother on the night of May 6, and again on the night of May 8, but for some unexplained reason not on the night of May 7. On May 10, the two surviving nestlings left their protected niche in the bank, at the age of 13 days. I had not touched them after they began to grow feathers, and I believe that their departure was spontaneous. They bore little resemblance to their parents, for their entire upper plumage, head, throat, and breast were dark slate-color, with no trace of chestnut on the crown, and no yellow on the forehead, face, or throat. But this juvenal plumage was worn for a very short while. By the end of May, young birds of the year were beginning to acquire the adult colors. (Since I had seen no indication of nesting until late March, it is unlikely that these birds had been hatched before the middle of April, at the earliest.) In the first stages of the postjuvenal molt, the forehead, lores, lower cheeks, and throat were pale yellow, flecked with gray, over an area of irregular outline. There was a broad gray band across the chest; the lower breast and belly were yellow—brightest on the flanks, fading to whitish in the center of the

abdomen. These changes were evident before chestnut feathers were visible upon the crown. The wings and tail resembled those of adults. By the middle of June, before they parted company with their parents, the young birds were difficult to distinguish from their elders. Since by August most of the Collared Redstarts were in pairs, it seems likely that the young of the year found mates very soon after becoming independent.

Summary

Three forms of *Myioborus* were studied in Central America, the Pacific Orange-bellied Redstart (*M. miniatus hellmayri*) in Guatemala, 1933; the Costa Rican Orange-bellied Redstart (*M. miniatus aurantiacus*) and the Collared Redstart (*M. torquatus*) in Costa Rica, 1937–38.

The Pacific Orange-bellied Redstart ranged from 2,000 to 9,500 feet above sea-level, but was particularly abundant in heavy, humid forests on the Pacific slope between 5,000 and 7,000 feet.

It frequently forages in the higher branches of the trees.

Outside the breeding season, the Pacific Orange-bellied Redstart avoids other redstarts of its species but attaches itself to the large mixed flocks of small birds that roam through the forest, in each of which there is usually a single Orange-bellied Redstart. If two males come together in the same mixed flock, one drives the other from the flock.

A nest with three eggs was found on May 13, 1933.

The female alone incubated, and the male did not even approach the nest during the incubation period.

In 12 hours of observation, 11 sessions on the eggs ranged from 26 to 49 minutes, with an average of 37.6 minutes; 12 recesses from incubation ranged from 10 to 37 minutes, with an average of 18.2 minutes. Of the total observation time, 67.4 per cent was devoted to incubation. In rainy weather, recesses were longer than in clear weather, but sessions on the eggs showed no significant change.

One nestling was hatched on May 22, two on May 23. They were sparsely covered with gray down.

During 3 hours of observation when the young were 2 and 3 days old, the female fed the nestlings 10 times in the intervals of brooding; the male fed them 5 times.

One nestling disappeared when a few days old. The other two left the nest on June 2 and 3, at about 11 days old (perhaps prematurely because of disturbance).

Their upper plumage, head, throat, and a portion of their breast were sooty gray; the lower part of the breast, and the belly were buff.

By late July, the young molt into a plumage very similar to that of the adults.

As soon as the young can take care of themselves, the families separate.

The Costa Rican Orange-bellied Redstart is found at middle altitudes; it is rare below 3,000 feet, abundant between 5,000 and 6,000 feet.

It forages chiefly in bushes near the ground.

The male sings in pleasant weather in every month of the year.

This redstart occurs in pairs throughout the year, the young finding partners a few months after they are fledged.

Fourteen nests were found. Nest building began during the last days of March or in early April. The nests were constructed in from 3 to 5 days. Nest sites varied: niches in a cut-bank (the favored location); hidden at the base of epiphytes on a fallen log; a slight depression in a steep slope among sheltering vegetation.

At one nest the male assisted in nest construction.

There was an average interval of a week between completion of the nest and the beginning of egg laying.

Two to three eggs were laid at one-day intervals. In 9 nests, the first egg was laid between April 7 and 13. In 3 nests (probably replacements of earlier nests), it was laid in May.

Incubation began with the laying of the last egg of the set. The incubation period varied from 13 to 15 days. All the eggs of a clutch hatched within a period of about 24 hours.

The newly hatched young were blind and sparsely covered with down. At the age of 9 or 10 days they were well-clothed with feathers, and were not brooded after the age of 10 or 11 days. They left the nest when from 12 to 14 days of age.

Of the 31 eggs laid, 10 (32 per cent) produced fledglings. Of the 11 nests that contained the 31 eggs, 5 (45 per cent) each produced at least one fledgling.

On leaving the nest, the young wore a plumage very much duller than that of the adults. By October they were indistinguishable from the adults.

The Collared Redstart ranges from 3,500 feet up to timberline and is fairly abundant between 5,000 and 8,000 feet. It is far less abundant than the Costa Rican Orange-bellied Redstart.

It forages at all levels but is most often seen at middle heights.

The species is usually seen in pairs or in groups of three to five.

A nearly completed nest was found on April 3. The male did not assist in nest building but remained in the vicinity, often accompanying the female on her trips for nest material. A second nest, newly begun on April 6, was not yet completed on April 18. A third nest, found on April 24, appeared to be completed on April 26 and contained one egg on April 30.

The first egg of a 3-egg set was laid on April 10 (6 days after the nest was apparently completed). The eggs were laid at one-day intervals.

Incubation began the day the last egg was laid. The female alone incubated. In 5 hours and 20 minutes of observation 11 days after incubation had begun, 8 sessions on the eggs varied from 27 to 30 minutes (average, 28.5 minutes); 8 recesses from incubation ranged from 7 to 13 minutes (average, 9.8 minutes). The incubation period was 15 days.

One nestling was found dead outside of the nest. The remaining nestlings were well feathered when 10 days old and left the nest when 13 days old.

By the end of May young Collared Redstarts begin to acquire the adult colors.

Literature Cited

Bent, Arthur Cleveland
1942 Life histories of North American flycatchers, larks, swallows, and their allies. *U.S. Natl. Mus. Bull. No.* 179.

Carriker, M. A. Jr.
1910 An annotated list of the birds of Costa Rica including Cocos Island. *Ann. Carnegie Mus.*, 6:314–915.

Dickey, Donald R., and A. J. van Rossem
1938 The birds of El Salvador. *Field Mus. Nat. Hist. Zool. Ser.*, 23:1–609, pls. 1–24.

Finca 'Los Cusingos,' San Isidro del General, Costa Rica

BIRD DISTRIBUTION AND ECOLOGICAL CONCEPTS

A SYMPOSIUM DIRECTED BY V. E. SHELFORD *

PART 2

BIRDS OF A DECIDUOUS FOREST AQUATIC SUCCESSION

BY JOHN W. ALDRICH

BETWEEN 1930 and 1936, I conducted ecological investigations of the bird populations of the swamps and bogs (hydrosere) of northeastern Ohio from the standpoint of the biotic communities as dynamic units. Birds of the various swamp habitats were considered to be a part of a series of plant and animal communities that are constantly changing steps in the development of the climax community of the region, which in northeastern Ohio is deciduous forest.

In the larger geographical sense, climate, in conjunction with genetic-evolutionary factors and physiographic barriers, controls the specific composition of plant and animal communities in any area. But this condition is modified locally,—in the hydrarch communities of northeastern Ohio, chiefly by the water content of the habitat. Certain factors, among them temperature and light intensity, are controlled by the organisms themselves. Chief of these organisms are the dominant plants which, by virtue of their life forms (such as reed, shrub, or broad-leafed tree) modify other factors. Certain combinations of factors in aquatic succession have permitted the partial survival in northeastern Ohio of boreal relic communities (developmental stages of the coniferous forest climax) similar to those that have elsewhere retreated far to the north in the wake of the Great Glacier. The presence of relic communities of typically boreal plants and animals is probably the chief reason that some investigators include northeastern Ohio and southern New England in the Transition life zone (Merriam, *et al.*, 1910).

I believe it is possible to bring together the life zone and biome concepts and unify the nomenclature, using the life zone names where applicable (Aldrich, 1943:357), and considering biomes rather than faunas as subdivisions of life zones. On this basis, northeastern Ohio is entirely within the eastern deciduous forest biome of the Upper Austral life zone, but still contains scattered post-glacial relics of the mixed coniferous and deciduous forest type which is found commonly farther north and in the Appalachian Mountains, and is characteristic

---

* Presented before the Wilson Ornithological Club at Urbana, Illinois, November 21, 1941. Part 1, "The Concept of the Biome as Applied to the Distribution of North American Birds," by Eugene P. Odum, appeared in *The Wilson Bulletin* for September 1945 (vol. 57, pp. 191–201). The parts as published are brief summaries of the papers originally read.

of the Transition life zone.[1] In this investigation the communities (including birds) were studied in both the relic coniferous (bog) and the deciduous forest (swamp) succession (Aldrich, 1943).

Table 1 shows the succession of communities and their most abundant birds in a typical swamp sere of northeastern Ohio from the water to the climax forest; Table 2 shows the breeding bird populations per

TABLE 1

SELECTED SPECIES SHOWING THE SUCCESSION OF BIRDS IN NORTHEASTERN OHIO FROM WATER TO THE DECIDUOUS FOREST CLIMAX

	1	2	3	4	5
	Water Lily	Loose-strife-Cattail	Button-bush-Alder	Maple-Elm-Ash	Beech-Maple
Pied-billed Grebe	S	S			
Common Mallard	X	S			
Virginia Rail		S	X		
Long-billed Marsh Wren		S	X		
Eastern Red-wing		S	S		
Eastern Swamp Sparrow		S	S		
Eastern Kingbird			S		
Alder Flycatcher			S		
Eastern Yellow Warbler			S		
Catbird			S	X	
Eastern Goldfinch			S	X	
Northern Yellow-throat			S	S	
Mississippi Song Sparrow			S	S	
Northern Blue Jay				P	
Eastern Hairy Woodpecker				P	P
Northern Downy Woodpecker				P	P
Eastern Wood Pewee				S	S
Eastern White-breasted Nuthatch				P	P
Black-capped Chickadee				P	P
Tufted Titmouse				P	P
Red-eyed Vireo				S	S
Eastern Oven-bird				S	S

X = present at times; P = permanent resident; S = seasonal.
Column 5 is from Williams (1936:57–58), other columns from Aldrich (1943: 389–392).

100 acres (40 hectares) in three of these communities over a period of years. The great annual fluctuations in these populations are apparently characteristic of hydroseral communities. The differences, particularly in the case of the Red-wings, Marsh Wrens, Yellow-throats, Swamp Sparrows, and Song Sparrows, were correlated with fluctuations in water level and resulting modifications of plant life.

[1] It should be noted that my concept of the Transition life zone (Aldrich and Friedmann, 1943:101) is not entirely that of Merriam (1910:map) and his followers, but includes the ecotones between the northern conifer and subalpine forests on the one hand, and between the deciduous forests and grassland on the other. That is, the zone encompasses the various forest-climax communities that have been called Lake Forest, Pine-Hemlock-Northern Hardwood Forest, Montane Forest, and Aspen Parkland.

TABLE 2

ANNUAL FLUCTUATIONS OF BIRD POPULATIONS IN NORTHEASTERN OHIO SWAMP SERE

	1932	1933	1934	1936	1937	1938	1939	Aver.
Loosestrife-Cattail	343	352	267	124	171	476	428	323
Buttonbush-Alder	390	268	561	1073	536	555	400	526
Maple-Elm-Ash	—	88	175	75	165	127	174	121

LITERATURE CITED

ALDRICH, JOHN W.
1943 Biological survey of the bogs and swamps of northeastern Ohio. *Amer. Midl. Nat.*, 30:346–402.

ALDRICH, JOHN W., and HERBERT FRIEDMANN
1943 A revision of the Ruffed Grouse. *Condor*, 45:85–103.

MERRIAM, C. HART, V. BAILEY, E. W. NELSON, and E. A. PREBLE
1910 U. S. Biological Survey fourth provisional zone map of North America. *A.O.U. Check-List of North American Birds* (3rd ed.): frontispiece.

WILLIAMS, A. B.
1936 The composition and dynamics of a beech-maple climax community. *Ecol. Monogr.*, 6:318–408.

U. S. FISH AND WILDLIFE SERVICE, WASHINGTON, D. C.

PART 3

BIRDS OF THE DECIDUOUS FOREST[1]

BY JOSEPH J. HICKEY

THE (broad-leafed) deciduous forest biome, as mapped by Pitelka (1941), approximates the forested region of Merriam's Carolinian zone, the humid eastern section of the Upper Austral zone. It includes, in addition, an oak-pine subclimax (made up of Carolinian and Austroriparian elements) and a pine subclimax (equivalent to the rest of the Austroriparian zone east of the Mississippi). The degree of control exercised on bird distribution by these types of vegetation has not yet been well studied. In *Florida Bird Life*, Howell follows the over-generalized bird communities of the life-zone scheme, while the specific communities of birds governed by water and vegetation are given by the

[1] Part of the author's remarks have been separately published in *A Guide to Bird Watching* (Oxford University Press, N. Y., 1943, pp. 106–118).

book's illustrator, F. L. Jaques. So many other avifaunal lists have been marked by an emphasis on bird distribution according to political subdivisions that an ecological analysis of the lists is now virtually impossible.

In Europe, a marked distinction between birds of the coniferous and deciduous forest was brought out by Palmgren (1928). Later, Lack and Venables (1939) compared the habitats used by English and Finnish birds. For the most part, species common to the two regions select the same forest types. However, seven species that select coniferous woods in Finland show no such tendency in Britain, where there is a much greater variety of broad-leafed woodland types. In the survey by Lack and Venables of 45 kinds of birds, 11 species were found to be almost entirely confined to broad-leafed woods, and 5 to coniferous woods. Such restrictions were correlated with geographical distribution, the former species being mainly southern and the latter northern.

In America, surveys and comparisons of this type are still needed. The marked effect of forest vegetation on the distribution of bird life has been studied by Hicks (1933), who has described six successive stages in the development of deciduous forest in northeastern Ohio, each with its own recognizable avian community. In New York, some 80 miles to the east, a virtually identical ecological succession of birds has been outlined by Saunders (1939), whose careful censuses have led him to postulate that the density of bird populations increases with the height of the forest canopy. This theory of bird numbers was earlier advanced in Germany by Schiermann (1934).

Literature Cited

Hicks, Lawrence E.
1933 The breeding birds of Ashtabula County, Ohio. *Wils. Bull.*, 45:168–195.

Howell, Arthur H.
1932 Florida bird life. Fla. Dept. of Game and Fresh Water Fish, Tallahassee.

Lack, David, and L. S. V. Venables
1939 The habitat distribution of British woodland birds. *Jour. Animal Ecol.*, 8:39–70.

Palmgren, Pontus
1928 Zur Synthese pflanzen- und tieroekologischer Untersuchungen. *Acta Zool. Fenn.*, 6:1–51.

Pitelka, Frank A.
1941 Distribution of birds in relation to major biotic communities. *Amer. Midl. Nat.*, 25:113–137.

Saunders, Aretas A.
1936 Ecology of the birds of Quaker Run Valley, Allegany State Park, New York. *N.Y. State Mus. Handbook* 16.

Schiermann, Gottfried
1934 Studien über Siedlungsdichte im Brutgebiet II. Der brandenburgische Kiefernwald. *Jour. für Ornith.*, 82:455–486.

Museum of Zoology, University of Michigan, Ann Arbor

PART 4

GRASSLAND BIRDS

BY O. A. STEVENS

THE species closely restricted to the grassland as a breeding ground include representatives of 10 or more diverse families and 5 orders: Marsh Hawk, Short-eared Owl, Burrowing Owl, Marbled Godwit, Upland Plover, Meadowlark, Bobolink, Brewer's Blackbird, Rock Wren, Sprague's Pipit, Nighthawk, Sandhill Crane, Horned Lark, and several sparrows.

There is some evidence of distribution corresponding to life zones. The grassland biome, extending from Mexico into Canada, may seem to be a vast natural area. Yet, though sharp lines cannot be drawn, it has definite variations. Sprague's Pipit and Baird's Sparrow nest only in the northern part; the Chestnut-collared Longspur extends a little farther south and the Lark Bunting still farther.

The return of certain individual birds to the same locality year after year shows that individuals are conditioned to definite latitudes. Plants are immobile, and although some grasses occur all over the biome, we are beginning to recognize that they, too, have races conditioned to certain localities. Much has been done by phytologists in defining physiologic races of fungi, but we know little of such races of birds and grasses.

Certain grassland birds are not limited to the biome, but choose areas with vegetation similar to the climax grassland. The Horned Lark is a characteristic prairie bird, but its range goes far beyond the grassland biome into all sorts of open spaces, especially those with short cover. It breeds in all parts of North America except the southeastern United States. It has been divided into a number of races, three of which breed in parts of the grassland biome.

STATE COLLEGE STATION, FARGO, NORTH DAKOTA

PART 5

CONIFEROUS FOREST BIRDS

BY ROGER TORY PETERSON

IN analyzing the most typical birds of the coniferous forest biome, we find that roughly one-third of them find their ranges within the great sweep of boreal forest stretching across Canada. Some examples are the Black-poll Warbler, Parula Warbler, Magnolia Warbler, Cape May Warbler, Bay-breasted Warbler, and Gray-cheeked Thrush. Roughly, another third are peculiar to the montane coniferous forests of the Western States. Some examples are the Steller's Jay, Clark's Nutcracker, Williamson's Sapsucker, and Townsend's Solitaire; the remaining third are birds that are common to the coniferous forest biome as a whole. Typical examples are the Red-breasted Nuthatch, Purple Finch, Pine Siskin, Hermit Thrush, and Olive-sided Flycatcher.

The ranges of many birds seem to conform to the outlines of the area occupied by their preferred vegetational "life form," while others occupy only parts of it and reach either their northern or their southern limits deep within it. This indicates that they are not entirely restricted in their distribution by dominant forms of vegetation. This, then, might leave room within the biotic concept for the application of something like Merriam's temperature concept, or some other modification. Thus it appears that the biome is not much more satisfactory than the life zone in describing bird distribution.

Birds which occupy the developmental stages of a biome are often found in other biomes as well. This is because the life forms of the vegetation that compose the developmental stages of one biome are often duplicated in other biomes. Birds which occupy the climax portion of a biome are most frequently restricted to that biome and are indicators of it. This is because the climax life forms are often peculiar to that one biome.

Birds appear to fit the life zone concept best in climax forest in those areas where temperature agrees with the vegetation, as, for example, in the Canadian and Hudsonian zones.

Briefly, the physical aspects, or "life form," of the vegetation seems to be the most important factor influencing land bird distribution, but this is further modified variously by climatic influences, physical barriers or other geographical factors, interspecific competition, population pressures, and probably also by other less tangible factors.

NATIONAL AUDUBON SOCIETY, 1006 FIFTH AVENUE, NEW YORK CITY

PART 6

THE RELATIVE MERITS OF THE LIFE ZONE AND BIOME CONCEPTS

BY V. E. SHELFORD

ACKNOWLEDGE of the greatest extent of the biomes, or biotic communities, is a fundamental step in making any comparison of the biome system with the life zone system. Figure 1 is a map of the principal North American biomes with the life zones superimposed. It is similar to the map by Weaver and Clements (1929: frontispiece) of which an earlier modification was published in 1932 (*Wils. Bull.*, 44: 154), but increased knowledge has made further modifications necessary.

To understand the basis for these modifications, the variations within biomes or climax areas * must be taken into account. We are

* In the legends of some maps (for example, the Weaver and Clements map mentioned here) the largest biotic communities are referred to as the "climaxes." "Climax area" would be a better term; thus the *climax area* is the area which it can be predicted will be covered by the *climax community* as shown by studies of succession.

Figure 1. Diagrammatic map of the areas of the principal North American biomes, or biotic climaxes. East of the Rocky Mountains the boundaries of life zones are superimposed; complications in mountainous regions prevent the extension of these boundaries westward, but their extreme limits are indicated on the map along the Pacific coast. The mountain coniferous forests from southern Arizona to the mountains of northern Panama have never been evaluated in terms of the biome concept; hence the solid black in that region on the map may be in error. The map is a modification of one by Weaver and Clements (1929: frontispiece). The ecotones and subclimax areas shown by Pitelka (1941: figure 1) are omitted. For further explanations see text.

all familiar with the several variations of the deciduous forest climax, such as beech-maple, oak-hickory, and oak-chestnut, which are called associations or forest types. Similarly we know the meaning of tall grass, short grass, and mixed tall and short grass types of grassland, also called associations. In plant ecology, associations or types are designated by the plants of outstanding abundance in the aggregations that make up the types or associations. Some of the abundant plants of each

association occur throughout the biome (binding species), while others are limited to the associations. However, usually all the most important plants of a biome are of the same "life form"; in the case of the deciduous forest, for example, they are broad-leafed trees. Important animals usually have a distribution within a biome similar to that of the plants. Modifications of the Weaver and Clements map are made necessary because of their failure (a) to include animals and (b) to give full value to life form of vegetation. It has been pointed out in the preceding papers of the symposium that life form characteristics are of great importance in the habitat preferences of birds.

In my modification of the Weaver and Clements map, the lake forest has been combined with the northern coniferous forest because there are no essential differences in the species of important animals in the two areas, and the life form is the same in both the climax and the developmental stages.

Although it could not be shown on the map, the boundary between two biomes is often very tortuous, with narrow extensions ("fingerings") of each biome penetrating the territory of the other. Often this is related to topography, the extensions of one biome being on higher ground than those of the other. A transition, or ecotone, is commonly a complex of these narrow extensions rather than a mixture on the same area of the plant and animal species characteristic of two or three biomes. This is especially true of biome boundaries in the Transition zone area and may be seen also along the boundary between the deciduous forest and grassland. The detail of such fingerings is too great to be shown except on a large-scale map. The small scale of Map 1 made it necessary to omit all ecotones as well as the mountain communities of the western and southern portions of North America. Several other areas, such as the Palm Forest, are small and have been little investigated. These have not been given biome names like those applied to the better-known communities.

In a practical way, biome and life zone systems are to be judged by the advantages or disadvantages of each when used as a guide (1) by an observer in the field; (2) in locating the boundaries of major communities; (3) in selecting indicator organisms; (4) in interpreting interactions, coactions, and reactions; (5) in interpreting community development.

1. Field observation. Since in the biome system, communities are named for the most numerous plants and animals, a student in the field can readily determine his "biological location" by the dominant and influent plants and animals (though the latter must commonly be found by special methods). The names of life zones, however, convey nothing that will help the field naturalist; he has usually to find his biological location on a life zone map. Some life zone students have characterized the zones by forest types but in limited areas only.

2. Locating the boundaries of major communities. The biome usually has quite definite limits which are observable on the basis of life forms. As noted above, a transition area is usually a complex of the narrow extensions of two or more adjoining biomes rather than a mixture of species representative of several biomes. Hence the limits of these major communities may usually be ascertained in the field and mapped to scale. There will sometimes be difficulties because of immature communities, but these can, as a rule, be distinguished by inspection of a considerable area where a series of stages converging to one community type is usually discernible. Outside the mountains, life zone boundaries follow the general trend of the isotherms (since they are based on temperature relations), and in much of the central part of the continent, the traveller cannot tell when he passes from one zone to another. It must be noted that some species are restricted to a portion of a biome on the basis of climatic differences that do not influence other species of the biome. Stevens, for example, in Part 4 of this symposium, has pointed out the limitation of the range of certain song birds to the northern great plains, which would support the idea of a Transition zone. However, the ranges of bison, antelope, and many other important species, such as dominant grasses, show no such relation to life zone boundaries, but are, in fact, cut into three parts by them. The southern boundary of the Transition zone on the great plains is based on species of less than secondary importance.

3. Selecting indicator organisms. Organisms used to indicate biomes are the plants and animals that exert an ascertainable important influence on the biotic community as a whole. They are usually abundant and obviously important so that they can be selected easily. Since they are the plants and animals of the final (climax) stage of the community, they clearly define the biome. Plants used as indicators of life zones outside of the mountains have, on the other hand, frequently been local or have belonged to relatively early developmental stages of biotic communities.

4. The biotic community viewpoint stresses interactions (coactions and reactions) of the various organisms. It carefully considers the function in the community of the population of each species, since each species contributes something to the community and has a definite effect upon it. The number of individuals per unit area is of primary importance. This interaction aspect of community dynamics was largely ignored in life zone work in earlier years, and quantitative data such as the number of animals per unit area is still rarely considered important in listing characteristic species for life zones or in mapping biotic areas.

5. Interpreting community development. The territory of a biome is the area which will be covered by the characteristic biotic climax. Within each biome's territory there are smaller areas with communities in various stages of development toward the climax. The study of

community development (succession) is one of the important features of the biome system. This development is usually ignored by life zone students and has led to confusion in the definition of zone boundaries, particularly in the southeastern United States.

Three other points of view should have brief mention, namely those of plant ecology, plant sociology, and limnology.

Plant ecologists began publication in the field of succession and distribution in terms of large communities in the early 1890's. An occasional writer took notice of animals and referred to "biotic factors," but most of the investigators have discussed plants only. To defend this position, they have relied on the dogma that all animals depend upon plants for food, shelter, and the preparation of the necessary place of abode. They have set up major communities based on plants alone; examples of these are the montane and subalpine forest and lake forests, which are not supported by animal data. The practical problems of grazing and forestry have forced them to give some attention to animals but only very recently.

Plant sociologists have presented admirable statistical methods of dealing with the details of plant populations, usually without reference to animals. A few zoologists have applied the analytic methods of the plant sociologists to animals alone. For example, Gislén (1930), working on Gullmar Fjord in Sweden, recognized more than 40 associations, whereas Peterson's map (1908) showed only 6, classified on the basis of biotic communities. Gislén fails, however, to discuss any features of community dynamics.

Limnologists have worked in great detail and with admirable precision on relatively small bodies of water. However, they have dealt mainly with internal chemical and biological changes—metabolism—rather than with the growth and distribution of communities.

But since none of these schools considers both plants and animals with their dynamic interrelationships, all fail to measure up to bioecological standards.

Literature Cited

Gislén, T.
1930 Epibioses of the Gullmar Fjord. A study in marine sociology. *Kristineburgs Zool. Sta.*, 1877–1927:Nos. 3–4 (K. Svenska Vetenskapsakadamien, Stockholm).

Petersen, C. G. J.
1908 Valuation of the sea II. The animal communities of the sea bottom and their importance for marine zoogeography. *Rept. Danish Biol. Sta.*, 21: 1–44 (and App. 1–68).

Shelford, Victor E.
1932 Life zones, modern ecology, and the failure of temperature summing. *Wils. Bull.*, 44:144–157.

Weaver, John E., and Frederic E. Clements
1929 Plant Ecology. McGraw-Hill Book Co., N.Y.

University of Illinois, Champaign, Illinois

WINTER NIGHT HABITS OF BIRDS

BY A. D. MOORE

AS Kendeigh (1934:343) has pointed out, "much more needs to be learned about the night habits of birds, particularly in winter." Kendeigh summarizes what is known of the winter roosting habits of a number of species. Some birds creep into the space between loose bark and the tree trunk; some cling in trunk depressions; some pass the night in natural cavities in trees, while others chisel out their own cavities. English Sparrows, alone or by groups, use thick bushes, vines next to buildings, or space in buildings. Other species find shelter in clumps of cattail or grass, or under clods. Some species gather in large numbers and spend the night close together in thick trees.

Heat Production and Temperature Regulation

Birds, in common with other warm-blooded animals, have a temperature-regulating mechanism that keeps body temperature at suitable levels. In a given case, the bird makes an adjustment to cold surroundings by first selecting a roosting place, and then by fluffing the feathers, placing the head under the scapular feathers, and perhaps huddling with other individuals. There will then be a certain demand placed on the bird because of the heat being lost. If the demand is low, it may be balanced by heat produced by the bird's lowest metabolism rate. When the demand is greater, physiological responses cause the regulating mechanism to act. Metabolism rises; that is, energy originally taken in as food is turned into heat at a greater rate, to meet the greater demand, and body temperature is maintained. If the demand (heat loss) is extreme, body temperature may be permitted to fall somewhat, and loss of heat is thereby reduced; but even so, there is danger that the bird's available store of energy will be used up, with death ensuing during the night.

This paper is not concerned with the physiological aspects of heat production and temperature regulation; but the foregoing makes it plain that since the bird's ability to produce heat is limited, its survival will often depend on its ability to keep heat loss within bounds.

Heat Loss Mechanisms

In order to know what to look for when observing the winter night habits of birds, the mechanisms or means whereby the bird loses heat should be clearly understood. The heat first travels by *conduction* from the warm skin, through the plumage, to the outer surface of the plumage. This heat is then taken away from the outer surface by two mechanisms, *radiation* and *convection*. Wherever outer surfaces of feet or plumage touch solid objects, there will also be loss by *conduction*, but this is usually small. The heat lost by radiation and con-

vection, added together, equals the heat conducted out through the feathers. Any adjustment by which the bird can reduce the effect of any of these heat loss mechanisms will, of course, help the bird to survive night exposure to a cold environment.

Conduction. The coat of a bird, consisting of air entrapped by overlapping feathers, is an excellent insulator; that is, it is a poor conductor. Nevertheless, it does conduct heat. When the feathers are "normal" (neither pressed down, nor fluffed out) the air is almost perfectly entrapped. The heat is then conducted from warm skin to colder outer plumage surface both by means of the entrapped air and the feather material itself.

Fluffing of the feathers is the very efficient means whereby the bird can secure a large increase in thickness of the insulating coat. With the feathers erected, the coat becomes several times as thick as in the normal state.

When the feathers are completely fluffed, they cannot do a perfect job of entrapping air among them, and movement of air through the feathers would reduce the insulating effect. Nothing is known about the extent to which fluffed feathers prevent this air movement. In my opinion, air movement through fluffed feathers will be nearly negligible if the bird is completely sheltered from the wind; and there is probably not much of it, even in a fair breeze, if the bird is headed into the breeze and the fluffing is not at its extreme degree.

Convection. When the outer plumage surface is warmer than the air, the surface loses heat to the air by convection. Convection will be one or the other of two kinds,—natural, or forced.

Natural convection occurs when the air and the bird are both still: there is no wind, and the bird is quietly sitting or sleeping. The only air movement will then be that of a natural circulation that is established. The warmer surface of the plumage warms the surrounding cooler air; the warmed air, becoming less dense, rises; a sluggish natural circulation is established, and the air removes heat from the surface by natural convection. (It will be necessary to modify these remarks later, when dealing with birds in very confined quarters.)

If the bird is directly exposed to a wind, the sluggish air movement of natural convection is wiped out. The wind gives forced convection cooling. The warmed air close to the bird is now rapidly replaced by cool air. For any given temperature difference between outer surface and air, the higher the wind velocity, the greater will be the forced convection heat loss.

Radiation. Loss of heat from the outer plumage surface by radiation cannot be taken up here in full technical detail. Nevertheless, some explanation of what takes place is necessary, because much that has been written about it is confusing and erroneous. The very term

radiation has suffered a great deal of misuse in many quarters. It is regrettably common to speak of all the heat that is dissipated by, for example, a "radiator" in a room, as *radiated* heat, even though such a body loses heat both by true radiation and by convection.

Radiant energy emitted by any surface travels in straight lines like light, and with the speed of light. At night, all of the radiant energy affecting the bird is in the long wave length (infra red) part of the spectrum. Such waves are emitted by the bird's outer plumage surface; by the ground, snow, twigs, leaves, enclosing walls of a cavity, and so on; by clouds overhead; and, in varying degrees, by the water vapor and carbon dioxide in the atmosphere, even with a perfectly clear sky.

If a bird is completely enclosed in a wooden box, or in a tree cavity, or cave, and *if* the temperature of the outer plumage surface is the *same* as the temperature of the walls of the complete enclosure, there will be *no* net loss (or gain) of heat by radiation. The outer plumage surface will emit, and therefore lose, heat by radiation; but the radiation coming from the walls will be absorbed by the plumage surface; the gain by absorption will just balance the loss by emission.

Or again, place the bird in the open, exposed to level ground below and to low, thick clouds above. If the bird's outer plumage surface should happen to be at the same temperature as the ground, and if weather conditions were not extreme, it could happen that radiation emitted by the ground and sent generally upward to the bird, plus radiation emitted by the atmosphere below the cloud and by the cloud itself and sent generally downward to the bird, might exactly balance the bird's radiation, and no net radiation loss would occur.

Or yet again, preserve the preceding conditions, except that we now remove the cloud and have a perfectly clear night sky. Radiation still comes downward from the water vapor and carbon dioxide in the clear atmosphere; but the amount of it will range from fully as much as when the low cloud was there, to somewhat less than half as much—depending, in an extremely complicated way, on ground temperature, relative humidity, and vertical distribution of temperature in the atmosphere.The highest air temperatures and humidities will cause the greatest downward radiation. Furthermore, the presence of haze complicates the situation. Haze increases the downward night radiation. Unfortunately, the relationships are so very complex that it is quite impossible to reduce atmospheric radiation to a simple set of rules.

The absence of haze and clouds usually means lessened downward radiation; low temperature and low humidity still further reduce it. Thus, on clear, cold winter nights, downward radiation being received by the bird's upper surfaces may be much less than the radiation emitted by those surfaces. A severe net loss of radiation energy will ensue. Thus the bird finds it necessary to *get under* an opaque cover—and it

is important for us to increase the accuracy of our observations on the nature of that cover.

If the cover is thick (or if made up of numerous layers of thin leaves) the temperature of the lower layers of the cover will closely approach the temperature of the air and ground; or, if these are different, it will be intermediate between the two temperatures. Such a cover will send downward much more radiation than would come from a clear, cold sky.

If a bird is found sleeping apparently directly exposed to the sky, but in a deep ravine, then it is receiving ground radiation from below, from the sides, and even to some extent from above. Exposure to the sky is of small consequence if the area of sky, as viewed from the bird's position, is small.

If a flock of birds settles in a tree, the individuals need not be in contact in order to reduce radiation losses. From the position of any one bird, if the view in all directions is largely covered by other birds, then the birds are effectively radiating to each other: a *completely* surrounded view would result in no radiation loss whatever. However, the outermost birds would radiantly lose heat from their exposed-view surfaces. (Do the outermost birds sometimes move in after a while, and let others take turns at exposure?)

Enclosed Roosts

A complete enclosure, such as a tree cavity with one small opening, insures freedom from wind. Instead of high loss from forced convection, there is the lesser natural convection effect that transfers heat from the bird to the air, and then from the air to the walls. This double-step transfer (bird to air, then air to walls) occurs when there is plenty of air space. But another complication arises. If the cavity is small, with perhaps an inch or less of air space between bird and wall, free natural convection currents may be largely slowed down by interference effects; the air would be relatively stationary, and the heat going by air would largely be *conducted* by air from bird to wall. The situation is misleadingly simple. Apparently, all we have is a warm bird, cold walls, and some air between; but the heat transfer problem is really highly complicated. As in the case of the atmospheric radiation problem, there is no hope of reducing it to simple rules.

In addition to the heat loss across the air by convection or conduction, as the case may be, there will, of course, be radiation loss, for the walls will be colder than the outer plumage surface.

If the wall of a tree cavity is hard unrotted wood, one small bird could do little toward raising the wall temperature. But if the wall has an insulating layer of dry rot or other lining, the wall itself would conduct heat outward less fast; and if the bird fits the cavity fairly well (or if several birds crowd in to add their heating effects), the temperature of the walls may very well rise appreciably through the

night and serve to reduce the loss on critical nights to a rate permitting the birds to survive.

Another factor is the size of the tree or branch in which the cavity is located. More often than not, winter night temperatures are lower than day temperatures. As the night progresses, a tree will cool. The larger the tree size at cavity level, the less the cavity wall will drop in temperature during the cooling process.

Still another factor is cavity size as related to fluffing ability. Rowan (1925:299), who has done a great deal of work with small birds in the very cold winters of Alberta, should be quoted: " . . . a friend who keeps a food-tray on her window-sill throughout the winter at Red Deer, Alberta, has informed me that Chickadees frequently come to feed in the early mornings during the very cold spells, with patches of ice on the head, particularly around the eyes. From the curled condition of their tail-feathers it is evident that they have spent the night huddled in holes." Now, if the hole is only small enough to curl the tail-feathers, no harm is done; but if it is so small that fluffing of the body feathers is seriously interfered with, the full effectiveness of the bird's natural insulating coat is not realized.

Open Roosts

Wind. A bird choosing not to sleep in a complete enclosure is exposed to wind. Observations on the wind actually affecting a bird offer great difficulty. However, the "wind facts" are of great importance to the bird. I have found nothing recorded in the literature about actual air movements past a sleeping, exposed bird in the natural state. Here, certainly, is a difficult but fruitful field for observation.

We do have weather station records of wind velocities. If a bird should consent to roost for the night next to the whirling anemometer cups, then the wind velocity records usually available would have considerable meaning. But the bird sleeps in a more suitable habitat. What is the wind velocity where the bird actually roosts?

A great deal of work has been done in recent years on the structure of winds. I have had to study some of the published research, and I think it will be well to mention some examples.

A wind sweeping over bare, flat ground at 10 miles per hour, 5 feet up, may typically be going at from 3 to 5 m.p.h. half a foot above the ground; and, at 25 feet above (where it might be measured by a weather station), it moves at from 12 to 18 m.p.h.

Next consider a wind which, like the one above, has a speed of 10 m.p.h. at 5 feet from the ground; but in this case, there is a brushy bush growth 3 feet high. Among the bush tops, the velocity may be only 1 or 2 m.p.h.; and further down, if the bushes are thick, it might drop to far less. At the 25-foot level, the speed may be somewhere around 25 m.p.h.

One series of tests covered an orchard situation, the trees being in rows. Tree height was 10 feet. A 27 m.p.h. wind at the 25-foot level resulted in a 10 m.p.h. wind between the tree rows. The velocity through the leafy trees themselves was probably between 2 and 5 m.p.h.

To cite one more situation, a 10 m.p.h. wind at the 5-foot level blows over 6-inch grass. A little above grass-top level, the velocity is about 2.5 m.p.h. But down in the grass, depending on level and thickness of grass, the velocity would be anything from perhaps 1 m.p.h. near the tips, down to a very low value close to the ground.

Further, the bird may be counted on to take advantage of ground irregularities, valleys, cliff indentations, and so on; and, if in a tree, to seek the leeward side of the trunk or entanglements of leaves.

Think of a bird nestled down in a thick clump of grass. Ten miles away, a weather station located on a stretch of flat ground is recording a low temperature and a night wind of 25 m.p.h. But the bird is located on the lee side of a forested hill, where the velocity at the 5-foot level may be only 5 m.p.h., and a few inches above the ground, inside the bird's grassy shelter, the actual wind speed may be less than half a mile per hour. If drifting snow has covered the windy side of the clump, the bird may experience no wind whatever.

It is out of the question to suggest that all observers of winter night habits of birds should always take to the field equipped with instruments for measuring wind speeds at the actual site. But the fact is that an "educated guess" at wind speed at the site would be more significant than a wind speed as measured at a weather station somewhere else in the same county. Better yet, there will be many situations and occasions when the timing of a bit of fluff or a puff of smoke will yield valuable information. Smokers are always ready to produce the smoke. Others can light punk, or oily rags. A stop-watch can be used for timing; or one can learn to count seconds quite accurately. The distance can be measured off, or paced.

If a roosting place is in a tree, the smoke source should be elevated on a pole, in order to measure the velocity at the roost level as nearly as may be, and through the site itself. If the roost is in a bush, it would be well to measure at a level one foot above the bush top, and again, if possible, through the bush at roost level. If the bird is in a grass clump, measure at one foot above grass-top level, or at whatever level is practicable; also, release some smoke on the windy side of a typical clump, and observe the smoke entering the clump,—how much does the smoke hang around inside the clump?

In making these suggestions, it is realized that some may have trouble in carrying them out; and further, so much variation occurs in ground contours, cover, and so on, that the suggestions are quite incomplete. What we need is ideas growing out of experience.

Finally, when there is a very cold wind at night, the bird that is in a complete enclosure of some kind will experience little or no wind;

and the bird not so enclosed may usually be expected to have found a lee, or a place in a thicket in a ravine, where the wind amounts to little more than an occasional puff and some irregular eddying. Such an irregular, occasional flow may be difficult to measure; but at least, the general behaviour of some released smoke can be described. Any information of this kind will be new and valuable.

Temperature. Here again, data from a distant weather station can be very misleading. Owing to differences in altitude, types of wind, exposure to clear sky, air stratification, and so on, there may be several, and sometimes many, degrees difference between a weather station temperature, and the temperature at the spot where the bird is. If a steady wind is blowing at the site, the air temperature taken within a few feet of the level of the bird's roost will probably be near enough. The more nearly windless the site is, the more necessary it is to place the thermometer at about the level of the bird's location, and not more than 10 or 20 feet distant horizontally. In any case, one must wait for the thermometer to stabilize its reading.

The thermometer is affected by radiation. Radiation effects sometimes cancel out, permitting the thermometer to record the true temperature of the air. However, one certainly cannot count on this happening. In the daytime, with a thermometer placed in the sunlight, the reading may be increased very considerably above air temperature. But even at night (especially with full exposure to clear skies) radiation can affect the reading. If the temperature is taken with the thermometer unshielded, it should be so recorded—along with the amount of sky exposure.

In weather station work, air temperatures are obtained by mounting the thermometer in a ventilated box. Such a box would hardly be portable, but a simple shielding device that will be far better than nothing, can be made from a piece of heavy cardboard. Punch a hole in the middle, and insert the bulb end of the thermometer through the hole until the bulb is perhaps an inch from the cardboard. When the cardboard is held horizontally, the bulb can be adjusted to be completely shielded from the sky.

Observing, Recording, Reporting

Eventually, accumulated experience will enable someone to develop a record-form for field use. The development and use of such a form would be most desirable. But so many variables enter in that I, at least, do not feel able to attempt the design of a form at this stage. It is quite possible that a single, general form would turn out to be a nuisance, and that we may have to develop particular forms for groups of related species. The next best thing, a list of suggested items to cover, is presented below.

Geographical location.
Dates and exact times of observations.

Lay of the land: General description for a mile or so around, with notes on forestation, etc.

Habitat: Elements of growth, local ground formation in relation to shielding from sky, from wind, etc. Hill top, valley bottom, or intermediate situation. Nearness to bodies of water which might prevent extreme fluctuations in temperature.

Site: Description of tree roost, cavity, clump, bark shield, etc.

Radiation cover: Overhead cover—description; in what degree does it shut off view of sky?

Weather station data: Location of nearest station. (Wind, temperature, and precipitation data should be reported from it when possible. This will help to emphasize the fact that the bird's survival may depend upon highly localized conditions.)

Temperature: How measured and where.

Wind: Velocity, how measured and where.

Number of birds: Estimate if accurate count is impossible.

Spacing of roosting birds: Average distance between the members of a group or flock. In close contact or not?

Adjustment of body feathers: Degree of fluffing (direct measurements and flashlight photographs are needed). If exposed, is the bird pointed into the wind?

Discussion

Kendeigh (1934), Baldwin and Kendeigh (1932), and Benedict (1938) will serve to introduce the reader to the large and growing literature on the bird's metabolism and temperature regulation. The literature relative to heat loss mechanisms is enormous and scattered through many fields in physics and engineering; reference to such literature is therefore omitted here.

Gathering of pertinent data on the survival of birds on cold nights is an almost virgin field of endeavor. If the bird's thermal problem is approached as an engineering problem to which a numerical solution is desired, it bristles with difficulties; but even an amateur can acquire a good understanding of the factors affecting heat loss, thereby becoming competent to observe and record much-needed data. Critical comparison of the data will be certain to yield illuminating results.

Literature Cited

Baldwin, S. Prentiss, and S. Charles Kendeigh
1932 Physiology of the temperature of birds. *Cleveland Mus. Nat. Hist. Sci. Publ.*, 3:1–196.

Benedict, F. G.
1938 Vital energetics. *Carnegie Inst. Wash. Publ. No.* 503:1–215.

Kendeigh, S. Charles
1934 The rôle of environment in the life of birds. *Ecol. Monogr.*, 4:299–417.

Rowan, Wm.
1925 On the effect of extreme cold on birds. *Brit. Birds*, 18:296–299.

College of Engineering, University of Michigan, Ann Arbor

GENERAL NOTES

Colorado nesting records of Starlings.—Starlings (*Sturnus vulgaris*) are now firmly established in Colorado, although they are not observed commonly. The first were taken in this state December 17, 1938 (R. B. Rockwell, *Wils.Bull.*, 51, 1939:46), and they have been recorded many times since, being quite numerous in the winter.

George Breiding (*Wils. Bull.*, 55, 1943:247) reported that an adult Starling was carrying food into a cracked tile of a silo near Lowry Field, Denver, Colorado, on May 16, 1943. He could not see the young, but heard them calling, and a week later he saw two young Starlings in a willow near by.

On May 25, 1945, I collected a set of five eggs, the first of this species to be secured in the state, from near Barr, Colorado. The nest was a bulky construction of grass in a hole in a box elder, about seven feet from the ground. I observed another nest, with large young, in this same general location on June 15, 1945.—ROBERT J. NIEDRACH, *The Colorado Museum of Natural History, Denver, Colorado.*

Robin using abandoned Cardinal nest.—In Hillsdale Park, Baltimore, in 1945, the nest of a Cardinal (*Richmondena cardinalis*) that had stood abandoned and empty for more than two weeks was taken over by Robins (*Turdus migratorius*) and used well into the period of incubation, at which time it was destroyed by human interference. The nest was in a position that Robins themselves might have chosen: in a tangle of honeysuckle about six feet up in an 8-foot redbud tree. It was constructed chiefly of honeysuckle vine, with a foundation of dead leaves and a lining of grass; it was fresh and clean, and the Robin made no noticeable alteration. Measured after some days' use by the Robin, it was 3 inches high by 5½ inches wide outside; the interior was oval in shape, 3½ inches long by 2½ wide, and 2½ deep. These figures differed hardly at all from the measurements of a newly made Cardinal's nest close by.

I inspected the nest daily between April 15 (when I first found it) and April 26, and irregularly between April 26 and May 1, always finding it empty. On the evening of May 5, however, it held a Robin's egg, which I marked. At 10:22 A.M. and 1:48 P.M. on May 6 there was still only that one egg, but between 9:54 and 11:35 A.M. (E.S.T.) on May 7, a second egg was laid; on May 8, a third; on May 9, a fourth. The eggs measured (in the order laid): 27.5 x 20.0 mm.; 28.0 x 20.0 mm.; 27.5 x 20.0 mm.; 27.0 x 19.5 mm.

There are few published instances of Robins using strange nests; Howell (*Amer. Midl. Nat.*, 28, 1942:529–603) describes their use of a Blue Jay nest and cites five instances from the literature of casual laying by Robins in other birds' nests. —HERVEY BRACKBILL, *4608 Springdale Avenue, Baltimore 7, Maryland.*

Absorbent for use in the preparation of scientific skins.—For several years I have used in the preparation of bird skins a finely ground cellulose (through a 150-mesh screen). I have found this "flock" much more effective than other absorbents. By alternate application of water and cellulose powder and removal of the powder with a soft brush, every trace of blood can be removed from the feathers, which are left in a fluffy, natural condition. The powder, particularly when moistened with a solvent for fats, is also very serviceable in removing grease from feathers. Its use during skinning to absorb blood and other liquids is obvious.

"Cotton flock" is made from cotton, "alpha flock" from wood pulp produced by a chemical process that renders it especially absorbent. The flocks, used largely in the production of molding compounds from synthetic resins, are commercially available, selling at about 10 cents a pound when bought in quantity. —A. W. SCHORGER, *168 N. Prospect Avenue, Madison, Wisconsin.*

Black and White Warbler feeding young of Worm-eating Warbler.—On June 2, 1945, while exploring a ravine in Good Hope Township, Hocking County, Ohio, John Wolfe, Fred Norris, W. Kelton Jones, Ralph J. Reynolds, and I found a nest with young of the Worm-eating Warbler (*Helmitheros vermivorus*). We watched the parents feed the young several times, and then saw a Black and White Warbler (*Mniotilta varia*) come to the same nest and feed the young birds.

As long as the Black and White Warbler remained perched in the small beech sapling at the base of which the nest was placed, the Worm-eating Warblers, although they remained in the immediate vicinity, did not seem much concerned. But when the Black and White Warbler would drop down to the nest, the Worm-eating Warblers would fly to the nest site and attack him. The Black and White Warbler would stand his ground until he could feed the young, which, on three or four occasions, he was able almost to finish before the parent birds could reach him. In one instance, the Worm-eating Warblers tore the food from his beak and themselves gave it to the young.

We watched from excellent viewing points not more than 30 feet from the nest. Before leaving, we examined the nest, which contained six Worm-eating Warbler nestlings, and were given a demonstration of the fearlessness of this species. In their attempts to protect the young, the parents came within an arm's reach of us. The Black and White Warbler did not participate in the defense, but it did attempt to draw us away from the nest by "injury feigning."

This phenomenon may be explained in part by the similarity in nesting sites chosen by the two species. Both are ground-nesting birds, and both often place the nest at the base of a sapling or tree stump. The association was, therefore, perfect for the Black and White Warbler and his response to the stimulus normal. —Gene Rea, *1836 North High Street, Columbus, Ohio.*

REPORT OF THE NOMINATING COMMITTEE

For the fourth year the Wilson Ornithological Club must conduct its annual election of officers and members of the Council by mail. Your Committee offers the following nominations for 1946:

President: George Miksch Sutton
First Vice-president: Olin Sewall Pettingill, Jr.
Second Vice-president: Harrison F. Lewis
Secretary: Maurice Brooks
Treasurer: Burt Monroe
Councillors: Milton B. Trautman, Rudolf Bennitt, George H. Lowery, Jr.

In addition to the slate offered above, any Active, Sustaining, or Life Member of the Wilson Ornithological Club is eligible for office. You are urgently requested to mail your votes to the Secretary whether you choose to support the slate given above, or whether you choose to write in the names of other eligible members for one or all of the offices.

Ralph Yeatter
W. J. Breckenridge
Ernst Mayr, *Chairman*

EDITORIAL

We are sorry to learn that, because of the pressure of other work, Milton Trautman will give up the Treasurership of the Club at the end of 1945. We are all much indebted to him, for the job is a difficult and very time-consuming one. The financial position of the Club is now better than it has ever been before, and much of the credit for this happy situation should go to the Treasurer, who has worked at his job so devotedly for the past three years.

Reuben M. Strong has very generously given the Club his back file of *The Wilson Bulletin* to be sold for the benefit of the Endowment Fund. We are also happy to report that Dr. Strong has given the Club Library his complete set of that very rare periodical, *The Curlew*, predecessor of *The Wilson Bulletin*. It was published in seven numbers from October 1888 to April 1889, and it contains the only contemporary record of the founding of our organization. The December 1888 issue records the founding of the "Wilson Chapter of the Agassiz Association" at Fall River, Massachusetts, on December 3 and publishes its constitution. *The Curlew* was designated the official organ. The officers were J. B. Richards, of Fall River, President, and Lynds Jones, of Grinnell, Iowa, Secretary. It is interesting to read in that first publication the plan that "our principal work will be on the nesting habits" of birds. The next issue of *The Curlew* contains more detailed plans and instructions to the members, closing with these words of sound and mature advice from the youthful Secretary: "Make no notes from memory, but jot them down in your notebook at the time they occur. Do not give general terms, such as 'late in March' or 'early in May,' but give the exact date . . . . "

The Editor is always glad to answer letters of inquiry from Club members about the books, reprints, and periodicals in the Club's Library. Members who have the *Bulletins* published during the last three years will find the books in the Library listed there in three installments (September issues for 1943, 1944, 1945), and an indication of the Club's principal holdings of pamphlets was published in September 1943, but meanwhile a great many gifts have been received.

We are grateful to the many people who have helped us edit the 1945 *Bulletin*. Special mention should be made of the assistance received from Maurice Brooks, Ludlow Griscom, J. J. Hickey, Margaret B. Hickey, Harrison F. Lewis, Harold Mayfield, Ernst Mayr, Olin S. Pettingill, Jr., Frank A. Pitelka, George M. Sutton, and Milton B. Trautman.

As predicted by Alfred Gross (*Maine Audubon Bulletin*, 1, 1945: 80), another of the periodic flights of Snowy Owls is invading the northeastern states this winter. A committee will prepare a report on this flight similar to the report on the flight of 1941 (*Wilson Bulletin*, 55, 1943: 8-10). The cooperation of Wilson Club members is requested. The committee will need to know the locality, inclusive dates, and numbers of owls seen. New England records should be sent to Alfred Gross (Bowdoin College, Brunswick, Maine) and Michigan records to C. T. Black (Game Division, Conservation Department, Lansing, Michigan). L. L. Snyder (Royal Ontario Museum of Zoology, Toronto 5, Ontario) will handle Ontario records and will forward records from other states and provinces to the respective representatives who are to be appointed later.

OBITUARY

FRANK M. CHAPMAN died in New York City on November 15, 1945, at the age of eighty-one. Curator in the American Museum of Natural History from 1888 to 1942, he also served as associate editor of *The Auk* (1894 to 1911) and founded *Bird-Lore*, which he edited for thirty-six years (1899-1934). A versatile man of great energy and powers of concentration, he became an acknowledged leader in such diverse fields as editing, wildlife conservation, museum exhibits, popularization of bird study, bird photography, zoogeography, and taxonomy. His sixteen books and scores of articles and shorter contributions brought not only a world-wide reputation among bird students but also recognition for himself and for the whole field of ornithology by the general public.

ORNITHOLOGICAL NEWS

The American Ornithologists' Union held its Sixty-third Annual Meeting in Cambridge on October 24. Because of travel difficulties the meeting was restricted to a one-day business session. Maurice Brooks, the appointed representative of the Wilson Ornithological Club on the Council, was unable to attend the meeting; Earle A. Brooks served as representative in his stead.

The Brewster Medal was awarded to H. Albert Hochbaum for "The Canvas-back on a Prairie Marsh." The check-list committee was instructed to proceed with the preparation of a final manuscript for a fifth edition of the A.O.U. Check-List of North American birds. The manuscript will probably be completed within a year.

The following officers and councilors were elected: President, Hoyes Lloyd; Vice-Presidents, R. C. Murphy and J. Van Tyne; Secretary, Lawrence E. Hicks; Treasurer, Frederick C. Lincoln; Councilors, Clarence Cottam, J. J. Hickey, George M. Sutton, and John W. Aldrich.

The members of the Union elected one Fellow, Jean M. Linsdale, and eight Members, A. Marguerite Baumgartner, A. D. Cruickshank, H. Albert Hochbaum, Francis H. Kortright, G. C. Munro, George J. Wallace, Leonard Wing, and Albert Wolfson.

At the suggestion of the officers of the Detroit Audubon Club, the Detroit Institute of Arts presented recently (October 20 to December 1) an exhibition of "American birds and their painters and sculptors." Edgar P. Richardson, Director of the Institute, prepared a remarkable historical series of bird drawings, paintings, and sculptured figures, beginning with the work of prehistoric man. The exhibition showed the work of more than fifty artists, many not commonly included in bird art exhibits, such as Peter Rindisbacher, Edward Walsh, John White, André Thevet, the Peales, Alexander Rider, and Alexander Wilson. Another unusual feature of the exhibition was the detailed and carefully written commentary accompanying the work of the artists. A complete showing of modern artists in the field was not attempted, but that group was well represented by the work of Fuertes, Allan Brooks, Jaques, and Sutton.

WILSON ORNITHOLOGICAL CLUB LIBRARY

The following gifts have been recently received. From:

Robert Goslin—1 reprint
Horace Groskin—1 reprint
Harold M. Holland—1 journal
Leon Kelso—1 pamphlet
George H. Lowery, Jr.—1 book
Harry A. McGraw—46 journals, 4 reprints
Minnie B. Scotland—1 reprint
O. A. Stevens—1 pamphlet
R. M. Strong—8 journals

ORNITHOLOGICAL LITERATURE

A NATURALIST IN CUBA. By Thomas Barbour. Little, Brown and Co., Boston, 1945: 5½ × 8 in., x + 317 pp., 16 pls. $3.00.

Probably no American is better qualified than Thomas Barbour to write about Cuba. His more than thirty trips to Cuba in the past thirty-six years have taken him to even the most remote parts of that beautiful island. His devouring curiosity and his encyclopedic knowledge of all fields of biology have enabled him to profit fully from his great opportunity. The result is a book worthy of a place on our shelves with the classic "naturalist" volumes of Bates and Belt.

The two chapters devoted to birds will not only provide a delightful introduction to Cuban birds for many beginners, but they will also furnish more advanced students with much valuable data on the habits and the status, past and present, of Cuban birds. Unfortunately, scientific names are largely omitted from the bird chapters (although they are invariably used in full in the chapter on bats, which follows), and even the vernacular names are in some cases hardly adequate for identifying the species being discussed without recourse to the author's "Cuban Ornithology" (1943)—from which, indeed, a number of the bird accounts are copied in full. Following the modern trend, the publishers have removed the capital letters from the proper names of birds in most cases (forgetting to do so in the case of the Caracara and the Jacana) and have thus provided further difficulties for the reader. In certain examples, these two practices result in passages which will surely be confusing to some readers. On page 132 we find ourselves reading about "little yellow rails." I am afraid that few readers will instantly realize that Barbour is talking about *Porzana flaviventer*, the little neotropical rail related to our Sora, and not *Coturnicops noveboracensis*, the Yellow Rail of all North American bird books. A possible third complication in the field of vernacular nomenclature results from Barbour's sometimes following that curious custom which we ornithologists have of using two or more vernacular names for a single species. We head our account "Bob-white" and then write entirely about "quail"; or we list the "Osprey" and then discuss the "Fish Hawk."

The additional chapters of especial interest to the naturalist deal with reptiles and amphibians, mammals, cave hunting (which here means hunting *in* caves), and the Soledad garden. Six other chapters (one of them called an appendix), describing and interpreting the island and its people, complete an absorbingly interesting book on Cuba as seen by a great naturalist.—J. Van Tyne.

BIRDS OF KENTUCKY. By Jesse Dade Figgins. University of Kentucky Press, Lexington, Kentucky, 1945: 6½ × 9⅝ in., 366 pp., 9 pls., 2 figs., 1 map. $2.50.

This dull, poorly illustrated, thoroughly disheartening book was published under a grant from the Haggin memorial trust fund. Since it obviously was not designed to rouse popular interest (the only bird picture in it is a Goshawk drawing by Fuertes, used without giving credit, and forced into service as a diagram to show a bird's topography), we naturally expect it to be an authoritative reference work to which we can turn for concise information concerning bird-life *in Kentucky*. What we find instead is a mass of carelessly chosen general information about species which may or may not have been recorded from Kentucky; sketchy, often inaccurate, descriptions of these birds; and discursive, futile comments as to the subspecies known or thought to occur within the boundaries of the State. Stumbling page by page through the book in our vain search for migration dates; for maps showing the distribution of such species as the Downy Woodpecker, Hairy Woodpecker, Black-capped Chickadee, and Carolina Chickadee, which are known to be represented by more than one race; for occasional reference to specimens in the principal bird collections made within the State, or for evidence that

these collections have been studied; and for reference to such important extra-limital work as that carried on by A. F. Ganier at Reelfoot Lake, Tennessee, we marvel that in such an 'enlightened age' as ours it is possible for so poor a book as this to appear. Furthermore, bearing in mind that younger bird students are even now being confused and misled by it, we earnestly wish there were some way of recalling the whole edition before more harm is done.

The University of Kentucky Press is wholly to blame for this gross misuse of funds. This publishing house could have secured the editorial assistance of some able Kentucky ornithologist or of some out-of-State authority and brought out a book which would have given bird students a sound basis for further work. To be sure, a good editor would have thrown out completely such sections as that on 'Color Terminology' (pp. 35-39); rewritten and considerably enlarged the introduction; presented a complete, accurate bibliography rather than a hit-and-miss list of titles; and, most important of all, worked out a valid philosophy and central purpose for the book. He would have spent long hours in re-evaluating the work of early authors, and possibly would have discarded as worthless the statements of Gilbert Imlay. He would have hunted down meagre but dependable data on old stuffed birds in hardware stores and in the museums of small colleges. He would have identified with great care specimens collected recently in this extremely interesting part of the United States. His list very likely would have been smaller than the present one. He would have indicated clearly that certain species were included on doubtful grounds. But the soundness and vitality of such a book would now be stimulating a desire to tackle and solve the problems of Kentucky bird distribution rather than killing enthusiasm for such work, as this volume does, through its cynical and lazy assumption that because a given bird has been recorded in an adjoining State, or somewhere along the Mississippi or Ohio River, it is practically a Kentucky bird anyway and therefore hardly worth going after; and through its repeated and ill-considered reference to the American Ornithologists' Union Committee on Nomenclature as a mysterious hierarchy bent on settling all subspecies problems independently of any taxonomic work the rest of us may do.

Now for the list itself. The author states (p. 39) that 354 bird species and subspecies "occur, or formerly occurred" in Kentucky; yet 361 forms, including four which have been introduced, are listed and discussed. Of these at least two should not have been even mentioned—the Mottled Duck (p. 84) and the American Raven, *Corvus corax sinuatus* (p. 219). The author's inclusion of these invalidates to some extent every statement in the book, causing us seriously to question his sight records for the Brewer's Blackbird (p. 300) and Boat-tailed Grackle (p. 301), and even to suspect that his specimen of Bicknell's Thrush (p. 245) may not actually have the measurements of this small race. Thus distrustful do we become of anyone who can hypnotize himself into believing it possible to distinguish *Corvus corax sinuatus* from *Corvus c. principalis*, or a female Mottled Duck from a female Mallard, in the field *in Kentucky* without obtaining so much as a feather in corroboration. In strict fairness to the author it should be said that we have not seen his original manuscript and therefore are not certain that it was his intention to give the American Raven and Mottled Duck full ranking in his list. Perhaps the editor was wholly to blame for such serious errors as these.

It is not possible, even with careful reading of the book, to determine whether certain species have actually been taken in Kentucky, or found breeding, or observed in migration. Most of the subspecific names, fortunately, are based on Dr. Wetmore's careful studies of Kentucky specimens; but it is all too plain that no effort was made by author or editor to find additional examples of this or that geographical race in the collections of A. F. Ganier, Burt Monroe, Robert Mengel, the Western Kentucky Teachers' College, or the State Teachers' College at Morehead.

In short, an adequate, up-to-date 'Birds of Kentucky' remains to be written. It is to be hoped that ornithologists will not feel obliged to refer to the present work too frequently lest, in so doing, they lead the younger generation into consulting, and possibly into imitating, an unworthy work.—George Miksch Sutton.

BIBLIOGRAPHY *

PHYSIOLOGY (*including weights*)

DAVIS, DAVID E. The Occurrence of the Incubation-Patch in Some Brazilian Birds. *Wils. Bull.* 57 (3), Sept. 1945: 188-190.

SOUTHERN, H. N. Dimensions of Gulls' Testes in Winter. *Ibis* 87, April 1945: 287-288.

See also *Life History and Behavior:* Meinertzhagen, Williamson.

PARASITES, ABNORMALITIES, AND DISEASE

BEAUDETTE, F. R. Aspergillosis and Parasitism in a Gull. *Bird-Banding* 16 (3), July 1945: 99-101. (*Larus argentatus.*)

BELLROSE, FRANK C. JR., HAROLD C. HANSON, and P. D. BEAMER. Aspergillosis in Wood Ducks. *Jour. Wildl. Manag.* 9 (4), Oct. 1945: 325-326.

DENTON, J. FRED. Apparent death of a Blue Jay from Toxoplasmosis. *Auk* 62 (4), Oct. 1945: 637.

HERMAN, CARLTON M. Gapeworm in California Quail and Chukar Partridge. *Calif. Fish and Game* 31 (2), April 1945:68–72. (A nematode, *Syngamus trachea.*—Reference from F. A. Pitelka.)

ANATOMY (*including plumage and molt*)

GLEGG, WILLIAM E. Barred Feathers in Birds. *Ibis* 87, July 1945:471–473.

POOR, HUSTACE H. Primaries of a Nine-Year-Old Herring Gull. *Bird-Banding* 16 (3), July 1945:102–104, photo.

See also *Ecology:* Storer.

DISTRIBUTION AND TAXONOMY

ALEXANDER, GORDON. Natural hybrids between *Dendroica coronata* and *D. auduboni. Auk* 62 (4), Oct. 1945:623–626.

BAILEY, ALFRED M. Rivoli's Hummingbird (*Eugenes fulgens*) in Colorado. *Auk* 62 (4), Oct. 1945:630–631.

BRANDT, HERBERT. A New Wren from Arizona. *Auk* 62 (4), Oct. 1945:574–577. (*Troglodytes brunneicollis vorhiesi,* new subsp. from Huachuca Mts.)

BRYENS, OSCAR MCKINLEY. The Greenland Wheatear in Luce County, Michigan. *Auk* 62 (4), Oct. 1945:631–632.

BULLOUGH, W. S. Physiological Races and Nomenclature. *Ibis* 87, Jan. 1945:44–48.

BURLEIGH, THOMAS D., and GEORGE H. LOWERY, JR. Races of Vireo griseus in Eastern United States. *Amer. Midl. Nat.* 34 (2), Sept. 1945:526–530.

CARL, G. CLIFFORD, and GEORGE A. HARDY. Flora and Fauna of the Paradise Mine Area, British Columbia. *Prov. Brit. Columbia Rept. Prov. Mus. Nat. Hist. and Anthrop. for 1944,* 1945:18–38, 2 photos. (Birds, pp. 31–32.)

CLARKE, C. H. D. Some Bird Records for Yukon Territory. *Canad. Field-Nat.* 59 (2), March 1945:65. (Includes important bibliography of Yukon birds.)

* Titles of papers published in the last number of *The Wilson Bulletin* are included for the convenience of members who clip titles from reprints of this section for their own bibliographic files. Reprints of this section are available at a small cost.

CONOVER, BOARDMAN. Notes on Some American Shorebirds. *Condor* 47 (5), Sept. 1945:211–214. (*Jacana, Charadrius alexandrinus, C. wilsonius, Arenaria,* and *Erolia alpina.*)

CONOVER, BOARDMAN. The Breeding Golden Plover of Alaska. *Auk* 62 (4), Oct. 1945:568–574.

DUVALL, ALLEN J. Variation in *Carpodacus purpureus* and *Carpodacus cassinii. Condor* 47 (5), Sept. 1945:202–205. (*Carpodacus purpureus rubidus* and *Carpodacus cassinii vinifer,* new subspp. from Washington.)

DUVALL, ALLEN J. Random distributional records. *Auk* 62 (4), Oct. 1945: 626–629.

HARDY, ROSS. Breeding Birds of the Pigmy Conifers in the Book Cliff Region of Eastern Utah. *Auk* 62 (4), Oct. 1945:523–542, pls. 23, 24.

HARRISON, JAMES M. Races, Intermediates and Nomenclature—a suggested Modification of the Trinomial System. *Ibis* 87, Jan. 1945:48–51.

HEISER, JOSEPH M. JR. Eskimo Curlew in Texas. *Auk* 62 (4), Oct. 1945:635.

MARSHALL, WILLIAM H. Winter Birds of the North Fork of the Flathead River, Montana. *Flicker* 17 (3), Oct. 1945:55–58.

MENDALL, HOWARD L. Canada Geese nesting in Maine. *Auk* 62 (4), Oct. 1945: 640–641.

MOORE, ROBERT T. The Transverse Volcanic Biotic Province of Central Mexico and its Relationship to Adjacent Provinces. *Trans. San Diego Soc. Nat. Hist.* 10 (12), Aug. 31, 1945: 217–236, map.

ODUM, EUGENE P. The Concept of the Biome as Applied to the Distribution of North American Birds. *Wils. Bull.* 57 (3), Sept. 1945:191–201. (Part 1 of Wilson Ornithological Club symposium, "Bird Distribution and Ecological Concepts," directed by V. E. Shelford.)

PACKARD, FRED MALLERY. Possible intergrades between the Myrtle and Audubon's Warbler. *Auk* 62 (4), Oct. 1945:623.

PETERS, HAROLD S., and THOMAS D. BURLEIGH. Some New Records from Newfoundland. *Auk* 62 (4), Oct. 1945:564–567.

RIPLEY, S. DILLON. The Barbets. *Auk* 62 (4), Oct. 1945:542–563, 2 figs.

ROGERS, GERALD. Black-billed Cuckoo nesting in Oklahoma. *Auk* 62 (4), Oct. 1945:632–633.

STONER, DAYTON. Additional unrecorded Passenger Pigeons from New York State. *Auk* 62 (4), Oct. 1945:622–623.

VAN ROSSEM, A. J. Preliminary Studies on the Black-throated Sparrows of Baja California, Mexico. *Trans. San Diego Soc. Nat. Hist.* 10 (13), Aug. 31, 1945: 237–244, map. (*Amphispiza bilineata carmenae* and *A. b. sanctissima* new subspp.)

WETMORE, ALEXANDER. A Review of the Forms of the Brown Pelican. *Auk* 62 (4), Oct. 1945: 577–586. (*Pelecanus occidentalis urinator* and *P. o. murphyi* new subspp. from Ecuador.)

See also *Life History and Behavior:* Gross.

MIGRATION AND FLIGHT

COOKE, MAY THACHER. Banding Records from the Pacific. *Bird-Banding* 16 (3), July 1945: 105.

COOKE, MAY THACHER. Recoveries from Colombia. *Bird-Banding* 16 (3), July 1945:106.

FARNER, DONALD S. The Return of Robins to Their Birthplaces. *Bird-Banding* 16 (3), July 1945:81–99, 1 fig.

GRAY, JOHN A., JR. Land Birds at Sea. *Condor* 47 (5), Sept. 1945:215–216.

SHELFORD, V. E. The Relation of Snowy Owl Migration to the Abundance of the Collared Lemming. *Auk* 62 (4), Oct. 1945:592–596, 1 fig.

SOOTER, CLARENCE A. Soaring geese at Tulelake, California. *Wils. Bull.* 57 (3), Sept. 1945:202. (*Chen hyperborea.*)

VAN TYNE, JOSSELYN, and MILTON B. TRAUTMAN. Migration records from Yucatan. *Wils. Bull.* 57 (3), Sept. 1945:203–204.

See also *Life History and Behavior:* Madsen.

ECOLOGY

FORMOZOV, A. N. Notes on the ecology of the sparrows (*Passer domesticus bactrianus* Zar. et Kudasch. and *Passer montanus pallidus* Zar.) and on their role in the agriculture of South Turcomania. *Zoologicheskii Zhurnal* 23 (6), 1944:342–350. (Russian, with English summary.—Reference from F. A. Pitelka.)

GLADING, B., R. W. ENDERLIN, and H. A. HJERSMAN. The Kettleman Hills Quail project. *Calif. Fish and Game* 31 (3), July 1945:139–156. (Field experiments and observations on ecological requirements of *Lophortyx californica.*—Reference from F. A. Pitelka.)

GLEGG, WILLIAM E. Fishes and other Aquatic Animals Preying on Birds. *Ibis* 87, July 1945:422–433.

IMLER, RALPH H. Bullsnakes and Their Control on a Nebraska Wildlife Refuge. *Jour. Wildl. Manag.* 9 (4), Oct. 1945:265–273, pls. 12–13. (Important enemy of ducks and other birds.)

KIMBALL, J. W. Effects of a Hail Storm on Pheasants and Other Wildlife. *Flicker* 17 (3), Oct. 1945:46–50.

LACK, DAVID. The Ecology of Closely Related Species with Special Reference to Cormorant (*Phalacrocorax carbo*) and Shag (*P. aristotelis*). *Jour. Animal Ecol.* 14 (1), May 1945:12–16.

STORER, ROBERT W. Structural Modifications in the Hind Limb in the Alcidae. *Ibis* 87, July 1945:433–456, figs. 7–13.

See also *Distribution and Taxonomy:* Odum; *Food and Feeding Habits:* Handley.

LIFE HISTORY AND BEHAVIOR

BAKER, EMILIE, and BERNARD BAKER. A Repeat Nesting of Robins. *Jack-Pine Warbler* 23 (3), July 1945:122–123, 2 figs.

BALL, STANLEY C. Observations of Red-breasted Nuthatches. *Auk* 62 (4), Oct. 1945:622.

BARGER, N. R. Some Conclusions About the Raven. *Passenger Pigeon* 7 (3), July 1945:69.

BROOKS, ALLAN. The Under-water Actions of Diving Ducks. *Auk* 62 (4), Oct. 1945:517–523, 3 figs.

CHAMBERLAIN, B. RHETT. Bachman's Sparrow Nest Found at Charlotte. *Chat* 9 (3), May 1945: 40–42. 3 photos. (North Carolina.)

DAVIS, MALCOLM. The Bald Eagle nesting in capivity. *Auk* 62 (4), Oct. 1945:634.

DAVIS, MALCOLM. Blue × Canada Goose hybrid. *Auk* 62 (4), Oct. 1945:636.

DAVIS, MALCOLM. English Sparrow anting. *Auk* 62 (4), Oct, 1945:641.

EMERY, DAN. Hybrid between Snow and Blue Goose in Washington, D.C. *Auk* 62 (4), Oct. 1945:636–637.

GIVENS, L. S. Limpkins Breeding on the St. Marks Refuge. *Fla. Nat.* 19 (1), Oct. 1945:18–19.

GROSS, ALFRED O. The Black Duck nesting on the outer coastal islands of Maine. *Auk* 62 (4), Oct. 1945:620–622, pl. 26.

INGLES, LLOYD G. Nesting of the Goshawk in Sequoia National Park, California. *Condor* 47 (5), Sept. 1945:215.

KENDEIGH, S. CHARLES. Nesting Behavior of Wood Warblers. *Wils. Bull.* 57 (3), Sept. 1945:145–164, 2 figs.

LINCOLN, FREDERICK C. The Mourning Dove as a Game Bird. *U. S. Fish and Wildl. Serv. Circ.* 10, 1945:1–8, 5 figs.

LOVELL, HARVEY B. Reaction of American Mergansers to Herring Gull depredations. *Wils. Bull.* 57 (3), Sept. 1945:202.

MADSEN, HARRY. On the different position of the legs of birds during flight and in cold weather. *Dansk Ornith. Foren. Tidsskr.* 39 (2), June 1945:98–105, figs. 1–7.

MEINERTZHAGEN, R. Reaction of Birds to War Noises. *Ibis* 87, July 1945:463–465.

MICHENER, HAROLD, and JOSEPHINE R. MICHENER. California Jays, Their Storage and Recovery of Food, and Observations at One Nest. *Condor* 47 (5), Sept. 1945:206–210, fig. 33.

MILES, ELEANOR, and PHILIP MILES. Raven's Nest. *Passenger Pigeon* 7 (3), July 1945:68–69, photo.

MOORE, JEANNE E. Five Barn Owlets. *Jack-Pine Warbler* 23 (3), July 1945: 95–104, 4 figs. (Nesting habits; Michigan.)

ORR, ROBERT T. A Study of Captive Galapagos Finches of the Genus *Geospiza*. *Condor* 47 (5), Sept. 1945:177–201.

RUEGGER, SAM. Nesting Ravens. *Passenger Pigeon* 7 (3), July 1945:59–61, 6 photos.

SKUTCH, ALEXANDER F. Life History of the Blue-throated Green Motmot. *Auk* 62 (4), Oct. 1945:489–517, pl. 22.

STANFORD, J. K. Variations in Birds' Songs and Call-notes in different Localities. *Ibis* 87, Jan. 1945:102–103.

SUTTON, GEORGE MIKSCH. Behavior of Birds During a Florida Hurricane. *Auk* 62 (4), Oct. 1945:603–606.

VOGEL, HOWARD H. JR. Cowbird parasitizes Wood Thrush and Indigo Bunting. *Auk* 62 (4), Oct. 1945:633.

WAGNER, HELMUTH O. Notes on the Life History of the Mexican Violet-ear. *Wils. Bull.* 57 (3), Sept. 1945:165–187, 10 figs. (*Colibri thalassinus.*)

WETMORE, ALEXANDER. The sleeping habit of the Willow Ptarmigan. *Auk* 62 (4), Oct. 1945:638.

WILLIAMSON, KENNETH. The Relation between the Duration of Hatching and the Incubation Period. *Ibis* 87, April 1945:280–282.

ZIRRER, FRANCIS. The Raven. *Passenger Pigeon* 7 (3), July 1945:61–67.

See also *Distribution and Taxonomy:* Mendall, Rogers.

FOOD AND FEEDING HABITS

COTTAM, CLARENCE. California Gulls Feeding on Midges. *Condor* 47 (5), Sept. 1945:216.

HANDLEY, C. O. Japanese Honeysuckle in Wildlife Management. *Jour. Wildl. Manag.* 9 (4), Oct. 1945:261–264. (Food and cover for several species of birds.)

NESTLER, R. B., L. M. LLEWELLYN, and M. J. RENSBERGER. Comparison of Animal and Plant Proteins for Young Pen-reared Bobwhite Quail. *Jour. Wildl. Manag.* 9 (4), Oct. 1945:274–279.

SHEPPARD, R. W. Gulls and terns hawking flying insects. *Wils. Bull.* 57 (3), Sept. 1945: 204.

SOUTHERN, H. N. Correlation between Beak and Food in the Crossbill. *Ibis.* 87, April 1945:287.

See also *Life History and Behavior:* Lovell, Michener and Michener.

POPULATION

BEVEN, G. The Winter Population in Transitional Scrub-bush at Grahamstown. *Ostrich* 16 (2), Sept. 1945:83–95, 3 figs. (South Africa.)

COBB, STANLEY. A Comparison of the Summer Resident Birds Today and Forty Years Ago in a Small Area in Massachusetts. *Auk* 62 (4), Oct. 1945:606–610, 1 fig.

COOKE, MAY THACHER. Longevity of the Sooty Tern. *Bird-Banding* 16 (3), July 1945:106.

GROSKIN, HORACE. Catbird at Least Six Years Old. *Bird-Banding* 16 (3), July 1945:106.

GROSKIN, HORACE. Five-Year-Old Song Sparrow. *Bird-Banding* 16 (3), July 1945:106–107.

TECHNIQUES (*including banding*)

DOWNING, STUART C. Color Changes in Mammal Skins During Preparation. *Jour. Mamm.* 26 (2), May 1945:128–132. (Includes 5 species of birds.)

NEWMAN, COLEMAN C. Turkey Restocking Efforts in East Texas. *Jour. Wildl. Manag.* 9 (4), Oct. 1945:279–289, 1 fig.

WANDELL, WILLET N. Rapid Method for Opening and Arranging Pheasant Bands. *Jour. Wildl. Manag.* 9 (4), Oct. 1945:325, pl. 15.

See also *Ecology:* Imler; *Migration and Flight:* Cooke (two titles), Farner.

HISTORY, BIOGRAPHY, BIBLIOGRAPHY, AND INSTITUTIONS

GRINNELL, HILDA W. The Ornithological Writings of Amelia Sanborn Allen. *Gull* 27 (11), Nov. 1945:41–43.

HOLMBERG, SEVERENA C. History of The Minneapolis Bird Club. *Flicker* 17 (3), Oct. 1945:59–61.

SCHORGER, A. W. Ned Hollister. *Passenger Pigeon* 7 (3), July 1945:78–83, photo. (Includes bibliography.)

PALEONTOLOGY

HOWARD, HILDEGARDE. Observations on Young Tarsometatarsi of the Fossil Turkey *Parapavo californicus* (Miller). *Auk* 62 (4), Oct. 1945:596–603, pl. 25, 1 fig.

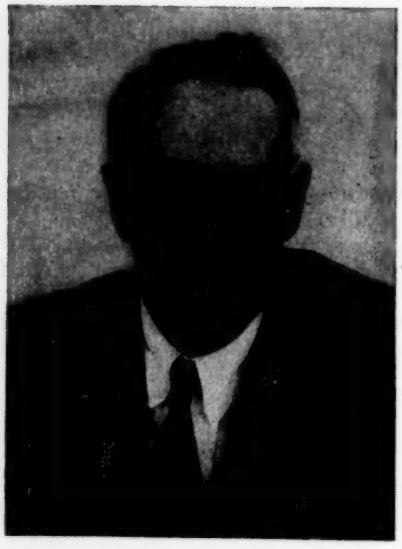
WETMORE, ALEXANDER. Record of the Turkey from the Pleistocene of Indiana. *Wils. Bull.* 57 (3), Sept. 1945:204.

AFFILIATED SOCIETIES

THE GEORGIA ORNITHOLOGICAL SOCIETY completed a major project on March 15 with the publication of "Birds of Georgia. A Preliminary Check-list and Bibliography" (University of Georgia Press), the first complete check-list and bibliography that has been compiled for the state. The Society plans to follow this technical publication with a popular bulletin on common birds of the state to supply the demands of schools, Boy Scouts, 4-H Clubs, garden clubs, and others. Thus the Society is devoting its energies to compiling and publishing material designed to stimulate active interest in ornithology.

Despite the fact that all the younger and most active members of the Society have been in the armed services, the Society has maintained its membership and improved its financial position during the past year. Publication of the *Oriole* has continued. A spring meeting, consisting of a business session, a field trip, and the showing of colored movies by Thomas D. Burleigh, was attended by about 45 members.—EUGENE P. ODUM, *President*

NEW LIFE MEMBERS



HERBERT L. STODDARD, SR., has been professionally engaged in wildlife work since 1905. The period from 1910 to 1924 was devoted to museum preparation and ornithological field work for the Milwaukee Public Museum and the Field Museum of Natural History. Since that time he has specialized in the study of upland game birds, especially the Wild Turkey and the Bob-white. His notable book on the latter species was awarded the Brewster Medal by the American Ornithologists' Union in 1935. In addition to working extensively on the avifauna of Georgia, where he now lives, he has carried on field investigations in Wisconsin (on Bob-white), Minnesota (on the Ruffed Grouse), Arizona (on Gambel's Quail), France and England (on the Gray Partridge and Ring-necked Pheasant).

DR. MAX MINOR PEET, surgeon and ornithologist, accompanied his first zoological expedition for the University of Michigan in 1904 while still a high school boy. That expedition, and another in 1905, provided material for his paper on bird migration and those on the birds of Isle Royale, and the Porcupine Mountains, Michigan. He received the M.D. degree from the University of Michigan in 1910, then served in Rhode Island Hospital, the University of Pennsylvania, and the Philadelphia General Hospital. In 1916 he returned to the University of Michigan, where he is now Professor of Surgery and Chief of the Neurological Division of the University Hospital. He is a member of the Society of Neurological Surgeons and of the American Surgical Association; a Fellow of the American College of Surgeons and of the American Medical Association. In 1932 he was a member of the University of Michigan expedition to the Chisos Mountains, Texas. Since then he has made bird collecting an integral part of the medical trips which frequently take him to distant parts of the country.

OFFICERS, COMMITTEES, AND MEMBERS OF THE WILSON ORNITHOLOGICAL CLUB

Officers, 1945

President.....S. Charles Kendeigh
First Vice-President.....Olin Sewall Pettingill, Jr.
Second Vice-President.....Harrison F. Lewis
Secretary.....Maurice Brooks
Treasurer.....Milton B. Trautman
Editor.....Josselyn Van Tyne

Additional Members of the Executive Council

Elective Members

Lawrence H. Walkinshaw — Eugene P. Odum

Burt L. Monroe

Past Presidents

Lynds Jones	Albert F. Ganier	Josselyn Van Tyne
R. M. Strong	J. W. Stack	George M. Sutton
Frank L. Burns	Jesse M. Shaver	Margaret M. Nice
T. C. Stephens		Lawrence E. Hicks

Editorial Staff of "The Wilson Bulletin"

Editor.....Josselyn Van Tyne
Associate Editor.....Margaret M. Nice
Associate Editor.....Frederick N. Hamerstrom, Jr.

Committees, 1945

Membership Committee. Frederick M. Baumgartner, *Chairman*

Affiliated Societies Committee. Gordon M. Meade, *Chairman,* George H. Lowery, Jr., Eugene P. Odum, O. A. Stevens, Harvey B. Lovell, Amelia R. Laskey, N. R. Barger, J. J. Murray

Illustrations Committee. W. J. Breckenridge, *Chairman,* Roger T. Peterson, Richard P. Grossenheider, Karl Maslowski, Terence M. Shortt

Endowment Fund Committee. George B. Thorp, *Chairman,* Olin Sewall Pettingill, Jr., James B. Young, Bernard W. Baker, Harold D. Mitchell

Library Committee. Harry W. Hann, *Chairman,* Lynds Jones, R. M. Strong

Wildlife Conservation Committee. Charles A. Dambach, *Chairman*

Representative on the American Ornithologists' Union Council. Maurice Brooks

MEMBERSHIP ROLL

****—Honorary Member. ***—Life Member. **—Sustaining Member.
*—Active Member. Others—Associate Members.

*Abbott, Cyril Edward, Wesley Junior College, Dover, Delaware 1937
Abbott, Jacob Bates, Whitehall, Haverford, Pennsylvania 1945
Adams, I. C. Jr., 104 Aldeah Ave., Columbia, Missouri 1933
Addy, Charles Edward, Upton, Massachusetts 1941
*Adelson, Richard Henry, 34 Wensley Dr., Great Neck, Long Island, New York 1938
*Aiken, Max J., 420 North Darling Ave., Fremont, Michigan 1945
*Aldrich, John Warren, Fish and Wildlife Service, Washington, D.C. 1930
Alexander, Donald C[hild], 127 Durant St., Lowell, Massachusetts 1937
Alexander, Gordon, Department of Biology, University of Colorado, Boulder, Colorado 1936
Alexander, Maurice Myron, 99 Mansfield Ave., Willimantic, Connecticut .1945
Allan, Philip F[arley], 1801 Carleton Ave., Ft. Worth, Texas 1939
*Allen, A[rthur] A[ugustus], Fernow Hall, Ithaca, New York 1914
Allen, Durward Leon, Rose Lake Wildlife Experiment Station, Route 1, East Lansing, Michigan 1933
Allen, Francis H[enry], 215 La Grange St., West Roxbury, Massachusetts .1941
Allen, Mrs. J. Owen, 4319 Hueco St., El Paso, Texas 1945
*Allen, Otis W., 504½ W. Market St., Greenwood, Mississippi 1944
Allen, Theodore, 2520 Mulberry Ave., Muscatine, Iowa 1942
Allin, A[lbert] E[llis], Provincial Laboratory, Fort William, Ontario, Canada 1943
Allyn, Capt. Paul Ricard, Waverly, Illinois 1944
*Alperin, Irwin, 540 West 40th St., Miami Beach 40, Florida 1939
Alpert, Bernard, 260 West End Ave., New York City 23 1939
Amadon, Dean, % Thorup, Route 1, Middleton, New York 1935
Amidon, Mrs. Hilda Farnum, 282 Sigourney, Hartford, Connecticut 1942
*Ammann, George Andrew, Game Division, Michigan Department of Conservation, Lansing 13, Michigan 1935
Anderson, Anders H[arold], Route 5, Box 331, Tucson, Arizona 1937
Anderson, John M., East Orwell, Ohio 1938
Anderson, R[udolph] M[artin], National Museum of Canada, Ottawa, Ontario, Canada 1937
Andrle, Robert Francis, 59 Blantyre Rd., Buffalo 16, New York 1944
Anthes, Clarence A[lvin], 713 Hamilton Ave., Waukesha, Wisconsin 1939
Anthony, Jesse D., 722 1st Ave., E., Grand Rapids, Minnesota 1944
Applegate, Mrs. Edith, 2209 Trenton St., Houston 10, Texas 1945
Appleton, J[ohn] S[parhawk], Simi, California 1936
*Armstrong, Miss Virginia, Musketaquid Rd., Concord, Massachusetts 1939
Arnett, John Hancock Jr., 6200 Ardleigh St., Germantown, Philadelphia, Pennsylvania 1944
Arnold, Elting, R.F.D. 3, Box 27, Wilson Lane, Bethesda, Maryland 1941
Arnold, Rev. Jay, 20 N. Pine St., York, Pennsylvania 1945
Ashley, Capt. James Franklin, 740 Santa Clara Ave., Alameda, California .1945
*Ashton, Randolph, 800 Crown St., Morrisville, Pennsylvania 1941
*Austin, Dr. Oliver L[uther], Box 236, Tuckahoe, New York 1930

[1] This list is compiled as of November 1, 1945. The Secretary would appreciate immediate notification of any omission of names, changes in address, or errors in the spelling of names, the use of titles, the class of membership, or the exact year of first election to membership.

Ayer, Mrs. N[athan] Edward, 1300 Hillcrest Dr., Pomona, California 1936
**Aylward, David A., 20 Spruce St., Boston 8, Massachusetts 1945
Ayres, Charles C. Jr., 922 N. Green St., Ottumwa, Iowa 1944
Baechle, Rev. John W[illard], C.P.P.S., St. Joseph's College, Collegeville, Indiana 1943
Baer, Miss Myrtle W., 1237 N. Jefferson St., Milwaukee 2, Wisconsin ..1941
*Bailey, Alfred Marshall, Colorado Museum of Natural History, City Park, Denver 6, Colorado 1928
**Bailey, Harold H[arris], Box 6333, 820 Alhambra Circle, Coral Gables, Florida 1908
Bailey, Mrs. H. M., 1020 Jones St., Sioux City 18, Iowa 1918
***Baker, Bernard William, Marne, Michigan 1938
*Baker, John H[opkinson], 1165 Fifth Ave., New York City 1930
Baker, Rollin Harold, Box 171, Eagle Lake, Texas 1938
*Baker, William C[alvin], 559 Euclid St., Salem, Ohio 1931
Baldwin, Mrs. Amy G., 6335 Kimbark Ave., Chicago 37, Illinois 1943
**Baldwin, Stephen Glidden, 406 Adams Bldg., Danville, Illinois 1945
**Ballard, Albert Donald, 1326 S. Stanislaus St., Stockton 35, California ..1944
*Banfield, Capt. A. W. Frank, 932 A. Avenue Rd., Toronto, Ontario, Canada 1945
Banks, Clinton S., 202 Wilma Ave., Steubenville, Ohio 1945
Banta, Miss Edna, Spencer, Indiana 1945
*Barber, Bertram A., Department of Biology, Hillsdale College, Hillsdale, Michigan 1945
**Barbour, Thomas, Museum of Comparative Zoology, Cambridge 38, Massachusetts 1945
Barkalow, Frederick Schenck Jr., 207 Washington Ave., Marietta, Georgia 1936
**Barker, Donald J., 1426 Nottingham Rd., Orlando, Florida 1945
Barlow, James H., 1913 Dewey Ave., Rochester 13, New York 1945
Barnes, William Bryan, Room 10, State House Annex, Indianapolis, Indiana 1941
*Bartel, Karl E[mil] Edgar, 2528 West Collins St., Blue Island, Illinois ..1934
*Bartlett, Guy, 1053 Parkwood Blvd., Schenectady 8, New York 1938
*Bartlett, Wesley H., 425 Beech Ave., Ames, Iowa 1936
*Bartsch, Paul, U.S. National Museum, Washington 25, D.C. 1894
*Bashour, Lt. Fred, Concho Field, San Angelo, Texas 1945
*Batchelder, Charles Foster, 7 Kirkland St., Cambridge, Massachusetts ...1927
Batchelder, Edgar M[arden], 690 Lynnfield St., Lynn, Massachusetts ...1941
Bates, Charles Evarts, Box 34, East Wareham, Massachusetts 1945
Bates, James Worth, 811 Woodlawn Rd., Steubenville, Ohio 1945
Battell, Harriet Chapman (Mrs. F. L.), 2812 Arbor St., Ames, Iowa 1942
*Baumgartner, Frederick Milton, Department of Entomology, A. & M. College, Stillwater, Oklahoma 1935
Baumgartner, Milton D., 311 McGeorge St., Stillwater, Oklahoma 1944
*Baumgras, Philip S., Swan Creek Wildlife Experiment Station, Allegan, Michigan 1945
Baxter, Miss Jean, 24654 West Lake Road, Bay Village, Ohio 1945
**Baxter, William, Mayflower Apts. C-503, Wilmington, Delaware 1945
Bear, Robert Murray Jr., 12 Ledyard Lane, Hanover, New Hampshire ..1945
Beard, Elizabeth Browne (Mrs. Allen Shelby), 9904 Berwick Rd., Rosedale Gardens, Plymouth, Michigan 1942
Beardslee, Clark Smith, 132 McKinley Ave., Kenmore, New York 1942
Beardslee, Miss Margaret Hortense, 410 S. Prospect St., Box 327, Ravenna, Ohio 1941
Beatty, Harry A[ndrew], % R. Kerr, 2350 Creston Ave., Bronx 53, New York City 1936

Beck, Rollo Howard, Planada, California 1943
Becker, George C[harles], Port Edwards, Wisconsin 1941
Becker, Mrs. Paul A., 251 East Phelps, Owatonna, Minnesota 1944
Bedell, Miss Marie L., 1430 West 20th St., Lorain, Ohio 1940
Bednarz, Felix L. Jr., 1665 Taunton Rd., Birmingham, Michigan 1944
*Beebe, Ralph, 4169 Tenth St., Ecorse 18, Michigan 1924
*Beebe, William, 33 W. 67th St., New York City 1944
*Beeghley, James L[eon], Route 1, Lee Run Rd., Poland, Ohio 1933
Behle, William H[arroun], Department of Biology, University of Utah, Salt Lake City, Utah 1935
*Behrend, Fred William, 406 Broad St., Elizabethton, Tennessee 1944
Belcher, Paul Eugene, 988 Jefferson Ave., Apt. 3, Akron, Ohio 1938
*Bellrose, Frank Jr., Illinois Natural History Survey, Havana, Illinois 1935
*Bennett, Clare Helmer, Biology Department, State University, Bowling Green, Ohio 1945
*Bennett, Logan J[ohnson], Pennsylvania State College, State College, Pennsylvania 1934
*Bennett, Miss Mary A[llison], 623 E. Carroll St., Macomb, Illinois 1933
*Bennett, Walter W., 5617 Harcourt Ave., Los Angeles 43, California 1945
*Bennitt, Rudolf, Department of Zoology, University of Missouri, Columbia, Missouri 1932
Benson, Mrs. Mary Heydweiller, 369 Seneca Parkway, Rochester 13, New York 1937
Benson, Seth Bertram, 645 Coventry Rd., Berkeley, California 1930
*Bent, Arthur Cleveland, 140 High St., Taunton, Massachusetts 1893
Berger, Capt, Andrew J[ohn], 418 Hazel Ave., Ellwood City, Pennsylvania 1940
Bergstrom, E[dward] Alexander, 9 Huntington St., Hartford 5, Connecticut 1943
*Biaggi, Virgilio Jr., Stone Laboratory, Put-in-Bay, Ohio 1945
Biddle, John, 16811 Fernway Rd., Shaker Heights 20, Ohio 1945
*Biette, Robert N., Pennellville Road, Brunswick, Maine 1945
***Billington, Cecil, 21060 Thirteen Mile Rd., Birmingham, Michigan 1939
Binnington, Miss Nora L[ouise], 6006 Cabanne Place, St. Louis, Missouri .1941
Birkeland, Henry, Roland, Iowa 1934
Bishoff, Miss Edna L., 2608 E. 6th St., Superior (East End), Wisconsin .1945
Bishop, Howard Elmer, 206 W. Packer Ave., Sayre, Pennsylvania 1941
**Bishop, Dr. Louis B[ennett], 450 Bradford St., Pasadena 2, California ..1903
Bissonette, Thomas Hume, Trinity College, Hartford 6, Connecticutt ...1939
*Bivins, Stephen T., Btry C, 134th F.A. Bn., Ft. Bragg, North Carolina ..1945
Black, Charles Theodore, Route 3, Grand Ledge, Michigan 1935
**Blackstone, Jess, 39 N. Spring St., Concord, New Hampshire 1945
*Blain, Dr. Alexander W[illis], 2201 Jefferson Ave., E., Detroit, Michigan .1902
Blair, Charles H., 209 Ellery Ave., Jackson, Michigan 1943
*Blake, Emmet R[eid], Chicago Natural History Museum, Chicago 5, Illinois 1939
Bliese, John C[arl] W[illiam], Address unknown 1944
*Blincoe, Ben[edict] Joseph, Route 1, Box 363, Dayton, Ohio 1919
Blincoe, Edith S. (Mrs. B. J.), Route 1, Box 363, Dayton, Ohio 1926
*Boggs, Ira Brooks, West Virginia University, Morgantown, West Virginia 1938
*Bole, Benjamin Patterson Jr., 2717 Euclid Ave., Cleveland 15, Ohio 1938
Bolt, Benjamin F[ranklin], 1110 Armour Blvd., Kansas City, Missouri ..1914
*Bond, James, 1900 Race St., Philadephia 3, Pennsylvania 1945
Bond, Richard M[arshall], P.O. Box 1671, Portland 7, Oregon 1936

Borell, Adrey Edwin, Soil Conservation Service, Box 1314, Albuquerque, New Mexico 1936
*Borror, Donald J[oyce], Department of Zoology and Entomology, Ohio State University, Columbus, Ohio 1927
Boulton, Rudyerd, 3317 Dent Place, N.W., Washington, D.C. 1942
Bourlière, Dr. F., Animal Nutrition Laboratories, Dairy Bldg., Cornell University, Ithaca, New York 1945
Bowdish, Beecher S[coville], Demarest, New Jersey 1921
Bowen, Leon W[alker], 77 Evergreen Ave., Bloomfield, New Jersey 1942
Bowers, J. Basil, 381 51st St., Oakland 9, California 1942
*Bowman, Lawrence L[incoln], Route 2, Ambler Rd., Canton, Ohio 1935
Boyd, Miss Elizabeth M[argaret], Mount Holyoke College, South Hadley, Massachusetts 1941
Boyd, Ivan L[ouis], Box 182, 1003 8th St., Baldwin, Kansas 1944
Boyer, Edgar, 3852 Charlotte St., Kansas City, Missouri 1945
Boyes, Mrs. Edwin G., 19164 Pennington Drive, Detroit 21, Michigan ..1945
*Brackbill, Hervey [Groff], 4608 Springdale Ave., Baltimore 7, Maryland.1942
Bradley, Miss Hazel Louise, 137 W. Morrell St., Jackson, Michigan 1944
Bradley, Homer L., Lacreek National Wildlife Refuge, Martin, South Dakota 1939
**Braman, Mrs. Myrtle, 206 W. Stayton Ave., Victoria, Texas 1945
Brand, Charles Salmon, Address unknown 1941
Brandenburg, Miss Arminta A[lice], State Hospital, Toledo, Ohio 1941
**Brandreth, Courtenay, Ossining, New York 1939
*Brecher, Leonard C[harles], 1900 Spring Drive, Louisville 5, Kentucky ..1939
*Breckenridge, Walter J[ohn], Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1929
Breiding, George H[erbert], 108 West Woodruff, Columbus 1, Ohio 1942
Brereton, E[wart] L[ount], Box 99, Barrie, Ontario, Canada 1943
***Bretsch, Clarence, 690 Broadway, Gary, Indiana 1925
Brigham, Edward M[orris] Jr., Kingman Memorial Museum, Battle Creek, Michigan 1931
*Brigham, H[erbert] Storrs Jr., 3817 Sedgwick Ave., New York City 63 ..1942
Brimley, Clement S., Division of Entomology, North Carolina Department of Agriculture, Raleigh, North Carolina 1942
Bristow, Harry Sherman Jr., Pine Ave., Cedars, Delaware 1942
*Brooks, Earle A[mos], 166 Plymouth Rd., Newton Highlands, Massachusetts 1933
***Brooks, Maurice Graham, Division of Forestry, Morgantown, West Virginia 1927
Broun, Maurice, The Northfield, East Northfield, Massachusetts 1935
Brown, Clarence D., 222 Valley Rd., Montclair, New Jersey 1938
Brown, E. E., Davidson College, Davidson, North Carolina 1945
Brown, N. Rae, Forest Insect Laboratory, Box 975, Sault Ste Marie, Ontario, Canada 1945
*Brown, Virginius Elholm, Biology Department, Taylor University, Upland, Indiana 1942
Brueggemann, Miss Anna L[ouise], 584 Sheridan Ave., Columbus 9, Ohio .1943
*Bruns, James Henry, 724 Whitney Bldg., New Orleans 12, Louisiana ..1941
*Bryens, Oscar McKinley, 231 S. Main St., Three Rivers, St. Joseph Co., Michigan 1924
Buchanan, Forest Wendell, Amsterdam, Ohio 1939
*Buchheister, Carl W., 1006 Fifth Ave., New York City 28 1943
Buckstaff, Ralph Noyes, Oshkosh Public Museum, Oshkosh, Wisconsin ..1941
Bundy, M[alcolm] F[oland], Route 2, Atlanta, Indiana 1941
**Burelbach, Maj. Martin J., 510 W. 4th St., Chattanooga 3, Tennessee ..1942

Burget, Russel Lincoln, 526 Devon Place, Toledo, Ohio 1944
Burland, Lee J[ohnson]), Ballston Lake, New York 1939
*Burleigh, Thomas D[earborn], Department of Zoology, Louisiana State University, Baton Rouge, Louisiana 1922
****Burns, Franklin Lorenzo, Berwyn, Pennsylvania .....Founder
Burr, Dr. Irving Wingate, 265 Littleton St., West Lafayette, Indiana 1945
Burroughs, Raymond Darwin, Department of Conservation, Lansing, Michigan 1937
*Burt, William Henry, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1928
*Burtch, Verdi, Branchport, New York 1924
*Butchart, G. Reeves, 123 N. State St., Ann Arbor, Michigan 1943
*Butler, Lawrence Michael, Address unknown 1940
Cadbury, Joseph Moore, Johnson Court 1, 16 E. Johnson St., Germantown, Philadelphia, Pennsylvania 1943
Cadman, Frederick L., 20 Exchange Place, New York City 5 1945
Cagle, Fred R., Museum, Southern Illinois Normal University, Carbondale, Illinois 1942
*Cahalane, Victor H[arrison], National Park Service, Merchandise Mart, Chicago 54, Illinois 1933
Calhoun, John Bumpass, Department of Entomology and Zoology, Ohio State University, Columbus 10, Ohio 1935
Calvert, William J[onathan] Jr., 615 N. Pelham Rd., Jacksonville, Alabama 1942
Campbell, Mrs. Edith Abbot, Lyme Rd., Hanover, New Hampshire 1945
Campbell, John David, 319 Ford St., Geneva, Illinois 1944
Campbell, John Howard, Med. Det., Madigan Convalescent Hospital, Ft. Lewis, Washington 1945
*Campbell, Louis W[alter], 4531 Walker Ave., Toledo 12, Ohio 1926
*Campbell, Miss Mildred F[lorence], 29 N. Hawthorne Lane, Indianapolis 1, Indiana 1938
*Capps, Beryl F[ranklin], 167 W. Robinwood, Detroit 3, Michigan 1939
Carnes, Mrs. Herbert E., 25 Kenwood Rd., Tenafly, New Jersey 1944
*Carpenter, Floyd S., 2402 Longest Ave., Louisville 4, Kentucky 1934
Carpenter, Mrs. Lana L., 915 Mendocino Ave., Berkeley 7, California ..1945
*Carroll, Lt. Col. Robert P., 8 Honeysuckle Hill, Lexington, Virginia 1942
***Carrothers, Miss Vera, 14704 Alder Ave., East Cleveland 12, Ohio 1938
*Carruth, Dorothy Ferrell (Mrs. Wade H.) Box 912, Corpus Christi, Texas.1945
*Cartwright, Bertram William, 59 Elm Park Rd., Winnipeg, Manitoba, Canada 1930
Case, Leslie Delos Sr., 714 West Madison St., Ann Arbor, Michigan 1938
Cassel, J[oseph] Frank[lin], 1529 Dauphin Ave., Wyomissing, Pennsylvania 1940
Castle, Eugene Spencer, 80 S. State St., Elgin, Illinois 1936
*Cater, Milam Brison, P.O. Box 133, Millboro, Virginia 1944
**Chamberlin, Charles A[biel], 1221 Mt. Rose Ave., York, Pennsylvania ..1945
*Chamberlin, C[harles] E[dward], Box 186, San Marcos, Texas 1944
**Chambers, W[illie] Lee, Robinson Rd., Topanga, California 1909
Chance, Edgar P[ercival], Gurdons, Witley, Godalming, Surrey, England .1941
*Chapin, James P., American Museum of Natural History, 79th St. and Central Park West, New York City 24 1945
Chapman, Floyd B[arton], 1944 Denune Ave., Columbus, Ohio 1932
Chapman, Lawrence B., 1 Woodridge Rd., Wellesley 81, Massachusetts .1940
Chapman, Mrs. Naomi Fran, Flossmoor, Illinois 1945
*Chase, Henry B. Jr., 517 Decatur St., New Orleans 16, Louisiana 1932

**Chatham, Comdr. Thurmond, 3331 O St., N.W., Washington, D.C. 1945
**Church, Charles Thomas, 70 Pine St., New York City 5 1945
Chutter, Miss Mildred C., Box 229, Athens, Ohio 1936
Clapp, G[eorge] Howard, Pabst Farms, Oconomowoc, Wisconsin 1941
Clark, James Robert, Route 3, Bucyrus, Ohio 1945
*Clarkson, Mrs. Edwin O., Winghaven, 248 Ridgewood Ave., Charlotte, North Carolina 1940
Clemens, William Bryson, Dublin High School, Dublin, Georgia 1942
Clement, Roland C[harles], 49 Tremont St., Fall River, Massachusetts ..1941
*Clow, Miss Marion, Box 163, Lake Forest, Illinois 1929
Coats, Miss Ruth Emily, 702 E. 1st St., Tillamook, Oregon 1942
*Coffey, Lt. Ben Barry Jr., 672 N. Belvedere, Memphis, Tennessee 1927
Cogswell, Howard L[yman], 3807 Sierra Grande St., Pasadena 8, California 1944
*Cole, Leon J[acob], Department of Genetics, University of Wisconsin College of Agriculture, Madison 6, Wisconsin 1921
*Coles, Victor, 2910 Grasselli Ave., Westwood, Cincinnati, Ohio 1929
Collias, Lt. Nicholas E., Department of Zoology, University of Chicago, Chicago, Illinois 1945
Common, Mrs. James A., 141 Flower Ave., W., Watertown, New York .1945
Compton, Miss Dorothy M., 22 Wilton St., Princeton, New Jersey 1945
*Compton, Lawrence Verlyn, 409 W. Webster St., Pittsburg, Kansas 1923
*Congdon, Dr. Russel T[hompson], Medical Arts Bldg., Wenatchee, Washington 1944
Conn, Robert Carland, 769 Park Ave., Bound Brook, New Jersey 1945
**Conover, [Henry] Boardman, 6 Scott St., Chicago 10, Illinois 1944
Conway, Albert E., 123 Pennock Place, Media, Pennsylvania 1939
*Cooch, [Fredrick] Graham, 685 Echo Dr., Ottawa, Ontario, Canada ..1945
*Cook, Miss Fannye Addine, State Fish and Game Commission, 2550 N. State St., Jackson, 44, Mississippi 1925
Cooley, Miss Eleanor Graham, R.F.D., Berwyn, Maryland 1936
Coombes, Robert Armitage Hamilton, Sea Bank, Bolton-le-Sands, Caraforth, Lancashire, England 1936
Corn, Lawrence R., 329 N. 41st St., Camden, New Jersey 1945
*Cottam, Clarence, Fish and Wildlife Service, Merchandise Mart, Chicago 54, Illinois 1929
Cottrell, George William Jr., 70 Lake View Ave., Cambridge 38, Massachusetts 1941
*Court, Edward J., 6415 Barnaby St., N.W., Chevy Chase, Maryland, Washington, D.C. 1944
Craighead, Frank C., 5301 41st St., N.W., Washington, D.C. 1941
Crane, Mrs. Myrick, Wonalancet, New Hampshire 1945
Crosby, John Alexander, 56 Broadway Ave., Toronto, Ontario, Canada ..1943
Cross, Edmund R[ust], 1751 University Ave., San Diego 3, California ...1941
*Cruickshank, Allan Dudley, Highland Hall, Rye, New York 1939
Cruttenden, John Rudy, 2020 Main St., Quincy, Illinois 1945
Cunningham, James W., 3009 E. 19th Terrace, Kansas City, Missouri 1935
*Currier, Edmonde S[amuel], 8541 N. Chicago Ave., St. Johns Station, Portland, Oregon 1930
*Curtis, Robert A., Candia, New Hampshire 1945
*Dahlberg, Wendell O[scar], 11312 S. Michigan Ave., Chicago 28, Illinois .1939
Dambach, Charles A., Department of Biology and Entomology, Ohio State University, Columbus 10, Ohio 1934
Damon, David, 724 Sixth St., Ames, Iowa 1933
Danner, May S. (Mrs. John M.), 1646 Cleveland Ave., N.W., Canton, Ohio 1921

**Darden, Mrs. Colgate W[hitehead], Executive Mansion, Richmond, Virginia 1943
Davey, Dr. Winthrop N[ewbury], University Hospital, Ann Arbor, Michigan 1941
*Davidson, William Mark, National Research Center, Beltsville, Maryland.1933
Davis, Clifford Vernon, 224 S. Church, Bozeman, Montana 1945
Davis, David E[dward], 721 Elmwood Ave., Wilmette, Illinois 1940
Davis, George, Route 5, Murfreesboro, Tennessee 1936
Davis, George W., 148 Northfield St., Montpelier, Vermont 1941
*Davis, L[ouie] Irby, Box 988, Harlingen, Texas 1933
Davis, W[illiam] B., Department of Fish and Game, College Station, Texas 1938
Dear, Lt. Col. L[ionel] S[extus], P.O. Box 127, Port Arthur, Ontario, Canada 1939
Dechen, Mrs. Lillian Orvetta, 14 Summer St., Port Dickinson, Binghamton 6, New York 1939
*Decker, C[harles] O., 6450 Kenwood Ave., Chicago 37, Illinois 1938
Dehner, Rev. Eugene William, 638 Stewart Ave., Ithaca, New York 1944
***Delacour, Jean T., 995 Fifth Ave., New York City 1944
Delavan, Wayne G., Route 2, Box 61, Bronson, Kansas 1943
De Long, Mrs. W. C., Clarion, Iowa 1945
*DeLury, Ralph Emerson, Dominion Observatory, Ottawa, Canada 1920
Denton, J[ames] Fred Jr., 1314 Meigs St., Augusta, Georgia 1945
DePuy, Margaret Kalke (Mrs. John S.), 4758 Lake Shore Rd., Port Huron, Michigan 1944
Derleth, August William, Sauk City, Wisconsin 1940
**de Schauensee, Rodolphe Meyer, Devon, Pennsylvania 1945
**DeSelm, Lt. Hal R[awie], H. & S. Co., Base Depot, Camp Elliott, San Diego 44, California 1943
***Desmond, Hon. Thomas C[harles], Box 670, Newburgh, New York 1942
*Deusing, Murl, Milwaukee Public Museum, Milwaukee, Wisconsin 1937
Devitt, Otto Edmund, 218 Eglinton Ave., E., Toronto, Ontario, Canada ..1935
Dice, Lee Raymond, Laboratory of Vertebrate Biology, University of Michigan, Ann Arbor, Michigan 1943
Dickinson, J[oshua] C[lifton] Jr., Department of Biology, University of Florida, Gainesville, Florida 1939
Dickinson, Mrs. William Winston, 2006 Reid Ave., Bluefield, West Virginia 1942
Dierker, William W[ilfrid], 4186a Sacremento St., St. Louis 15, Missouri.1944
*Dietz, Robert Austin, 220 Beechwood Rd., Ridgewood, New Jersey 1944
Dille, Fred Monroe, 822 Grand Ave., Nogales, Arizona 1912
Diller, Oliver Daniel, 1433 Beall Ave., Wooster, Ohio 1945
Dingle, Edward von Siebold, Huger, South Carolina 1921
*Dixon, Miss Clara, Department of Zoology, University of Michigan, Ann Arbor, Michigan 1945
*Dixon, J[ames] B[enjamin], Route 1, Box 688, Escondido, California ..1936
Dobbins, H[ugh] C[linton], 1456 Clifton Blvd., Lakewood 7, Ohio 1941
*Dodge, Victor K[enney], 137 Bell Court West, Lexington, Kentucky 1935
Doering, Hubert R., 2 Midland Gardens, Bronxville 8, New York 1945
Domm, Lincoln V[alentine], Whitman Laboratory of Experimental Zoology, University of Chicago, Chicago 37, Illinois 1936
Donaghho, Walter Raymond, % Washington State College P. O., Pullman, Washington 1945
Donaldson, Harry Byron, 18 Second St., Mt. Clemens, Michigan 1943
*Douglass, Donald W., Department of Conservation, Game Division, Lansing 13, Michigan 1929
*Downer, Alice Porter (Mrs. C. T.), Address unknown 1945

Downing, Paul E[arl], 835 Waukegan Ave., Highland Park, Illinois 1943
Drey, Miss Minniejane, 616 Foster St., Evanston, Illinois 1945
Dreyfoos, Wallace David, 1212 Virginia Ave., N.E., Atlanta, Georgia ...1941
Drum, Miss Margaret, 217 South St., Owatonna, Minnesota 1937
*Dudley, John M[unchie],20 Germain St., Calais, Maine 1944
Duer, Harry E., 9304 Edmunds Ave., Cleveland, Ohio 1941
*Duffield, Marjorie Olney (Mrs. John W.), 1180 Cragmont Ave., Berkeley 8, California 1940
***Dugan, Dr. William Dunbar, McCaw General Hospital, Walla Walla, Washington 1945
*DuMont, Philip A[tkinson], Fish and Wildlife Service, Merchandise Mart, Chicago 54, Illinois 1928
*Duncan, Donald Pendleton, 5841 Nickerson Ave., Chicago 31, Illinois ...1936
Dundas, Lester Harvey, Braham, Minnesota 1943
Dusi, Julian L[uigi], Blacklick, Ohio 1941
*Duvall, Allen Joseph, Fish and Wildlife Service, Washington 25, D.C. 1942
*Eagleson, Joseph P., 85 East Gay St., Columbus 15, Ohio 1943
*Eastman, Whitney H[askins], % General Mills, Inc., Chamber of Commerce Bldg., Minneapolis, Minnesota 1941
*Eastwood, Sidney Kingman, 5110 Friendship Ave., Pittsburgh 24, Pennsylvania 1928
Eaton, Stephen W[oodman], 808 South Main St., Geneva, New York ...1942
*Edge, Mrs. Charles N[oel], 1215 Fifth Ave., New York City 29 1931
*Edwards, Robert Davis, 81 Hamilton St., Hamilton, New York 1945
*Edwards, Capt. Robert L., 81 Hamilton St., Hamilton, New York 1945
*Eifert, Virginia Snider (Mrs. H. D.), Illinois State Museum, Springfield, Illinois 1941
*Eifrig, Charles William Gustave, Windermere, Orange Co., Florida 1907
Eisenmann, Eugene, 110 West 86th St., New York City 1942
*Ekblaw, George Elbert, 511 W. Main St., Urbana, Illinois 1914
*Ekblaw, Walter Elmer, Clark University, Worcester, Massachusetts 1910
**Eklund, Dr. Carl Milton, Minnesota Department of Health, University Campus, Minneapolis 14, Minnesota 1945
*Eklund, Carl R[obert], Proof Division, Eglin Field, Florida 1944
Ekse, Mrs. Kay Elizabeth, 609 Wisconsin, Huron, South Dakota 1945
Elder, William Hanna, 5136 Kimbark, Chicago, Illinois 1938
*Elliott, Richard M., 1564 Vincent St., St. Paul 8, Minnesota 1940
Ellis, Miss Hazel R[osetta], Kenka College, Kenka Park, New York 1942
***Ellis, Ralph, 12 Administration Bldg., University of Kansas, Lawrence, Kansas 1926
Emerson, David L[owell], 25 Everett Ave., Providence, Rhode Island ..1939
*Emerson, Guy, 16 Wall St., New York City 1938
*Emilio, S[hepard] Gilbert, Route 4, Laconia, New Hampshire 1929
Emlen, John Thompson Jr., Psychobiological Laboratory, Johns Hopkins Hospital, Baltimore, Maryland 1936
Empey, Miller, Freeland, Michigan 1939
*English, Pennoyer Francis, Department of Zoology, Pennsylvania State College, State College, Pennsylvania 1934
Ennis, James H[arold], Cornell College, Mt. Vernon, Iowa 1942
*Erickson, Mary M[arilla], University of California Santa Barbara College, Santa Barbara, California 1930
Erickson, Ray C[harles], 1104 Washington Ave., St. Peter, Minnesota ..1939
*Errington, Paul L[ester], Iowa State College, Ames, Iowa 1932
*Eslinger, Kenneth N[elson], Box 67, Harvel, Illinois 1944
Etz, Mrs. Elizabeth Cecilia, Thornhedge, Wheeling, West Virginia 1940

**Eustice, Edith C. (Mrs. A. L.), 1138 Sheridan Rd., Evanston, Illinois ..1944
*Evans, Dr. Evan Morton, 550 Park Ave., New York City 1929
Evans, Ulmont L., 3112 S. Fourth St., Shelbyville, Illinois 1945
**Everett, Miss Louise A., 3824 Pillsbury Ave., S., Minneapolis, Minnesota..1944
*Fables, David George, 421 Walnut St., Roselle Park, New Jersey 1944
Faegre, David [Colin], Stoddard, New Hampshire 1940
Fahrenholz, Fred E[mery], 2912 Elmo Place, Middleton, Ohio 1942
Fales, John H[ouse], 1917 Elkhart St., Silver Spring, Maryland 1939
**Fargo, William G[ilbert], 506 Union St., Jackson, Michigan 1923
*Farner, Donald S[ankey], % C. S. Copps, 4332 North 32nd St., Omaha 11, Nebraska 1941
Farquharson, Miss Jessie, 2338 Marshall Ave., St. Paul 4, Minnesota 1944
Farquharson, Miss Mildred Grace, 2338 Marshall Ave., St. Paul 4, Minnesota 1944
Feighner, Miss Lena Veta, 298-1 S. Tremont St., Kansas City, Kansas ..1935
Feigley, Miss Margaret Denny, 544 Chestnut St., Winnetka, Illinois 1944
Findlay, Miss Violet L[iberty], Board of Education, 11th and Washington Sts., Wilmington, Delaware 1943
Finster, Miss Ethel B., Louisburg College, Louisburg, North Carolina ...1931
Fischer, Richard B[ernard], 140-19 Beech Ave., Flushing, New York 1942
Fleetwood, Raymond J[udy], Piedmont Wildlife Refuge, Round Oak, Georgia 1931
Fleugel, James Bush, 1104 American National Bank Bldg., Kalamazoo, Michigan 1942
Flick, Miss Katherine Jane, 5150 W. Pierson Rd., Flint 7, Michigan 1944
Floyd, E[arl] Pershing, 107 S.E. Second St., Pryor, Oklahoma 1939
*Floyd, Judge Joseph Larke, 1009-11 George Harter Bank Bldg., Canton, Ohio 1903
*Foote, Maurice E[dwin], R.F.D. 1, Mantua, Ohio 1932
Ford, Edward R[ussell], Newaygo, Michigan 1914
Forsyth, Mrs. Louise [Ann], 71 Lebanon Rd., Hanover, New Hampshire .1940
Fox, Adrian C[aspar], Box 1451, Lincoln, Nebraska 1937
France, H[orace] Owen, 6042 Ellis Ave., Chicago, Illinois 1941
Freer, Marion F. (Mrs. R. Lloyd), 4 Lenox Place, St. Louis 8, Missouri..1942
**French, Mrs. Elizabeth Thomas, 1801 Las Lomas, Albuquerque, New Mexico 1943
Frey, Edward Snively, 517 Hummel Ave., Lemoyne, Pennsylvania 1944
Frost, Herbert Hamilton, "Pen Craig," Newport, Rhode Island 1941
Frye, O. Earle Jr., 432 Avenue A, N.E., Winter Haven, Florida 1940
Fryman, Miss Kathryn E[lizabeth], 409 Elm St., Wyandotte, Michigan ..1943
Fuller, Raymond Tifft, Winterton, New York 1943
Funsten, R[andolph] Fairfax, 1515 Delmar Blvd., St. Louis, Missouri ..1944
*Furniss, Owen C[ecil], Port Alberni, Vancouver Island, British Columbia, Canada 1934
*Gabrielson, Dr. Ira N[oel], Fish and Wildlife Service, Washington, D.C. ..1913
Gaillard, Stephen Lee, 9 Lee Place, Bronxville, New York 1942
Gaines, Jack Raymond, 411 W. Koch St., Bozeman, Montana 1945
Galley, John E., 3543 E. 22nd St., Tulsa 4, Oklahoma 1945
*Gammell, Dr. Robert T[heodore], Kenmare, North Dakota 1943
**Ganier, Albert F[ranklin], 2112 Woodlawn Dr., Nashville, Tennessee 1915
*Gardner, Irvine M., % Hudson Bay Co., Clyde River Post, Baffin Island, N.W.T., Canada 1945
Garrett, Miss [Mary] Lois, 1709 Chestnut St., Kenova, West Virginia ..1942
Garrison, David L[loyd], Pagan Point, Wianno, Massachusetts 1940
Garst, Miss Virginia Louise, De Soto, Indiana 1944

Garth, Lt. John S., Station Hospital, Boca Raton AAF, Boca Raton, Florida 1945
Gashwiler, Jay S., Maine Wildlife Research Unit, University of Maine, Orono, Maine 1944
Gatterdam, Paul C[hristoffers], 2539 Edgewood Place, LaCrosse, Wisconsin 1940
Gaulding, Luther Willard Jr., 1002 College Ave., Tifton, Georgia 1944
Gavin, Angus, Eskimo Point, via Churchill, Manitoba, Canada 1942
Geren, Roy S., Continental, Ohio 1945
Gershten, Miss Blossom, 2816 Cortland St., Brooklyn 24, New York 1944
Gerstell, Richard, Pennsylvania Game Commission, Harrisburg, Pennsylvania 1939
Gibbs, Walter C., Whitehall, Michigan 1941
Giddings, Calvin John, American Fork, Utah 1945
Gier, Dr. Herschel Thomas, Ohio University, Athens, Ohio 1937
Gifford, Harold, 3636 Burt, Omaha, Nebraska 1936
Gilbert, Gareth, 2422 Indianola Ave., Columbus, Ohio 1943
Gilbert, Miss Kathryn Helen, 714 1st Ave. W., Grand Rapids, Minnesota.1945
**Gillen, Harold W., Denslow Rd., New Canaan, Connecticut 1944
Gillette, D[elbert] A[sa], Route 5, Yakima, Washington 1942
Giltz, Maurice L[eroy], 841 Lincoln Way, N.W., Masillon, Ohio 1939
Ginn, William Edward, 511 East Van Buren, Columbia City, Indiana 1941
Givens, Laurence S[pessard], Box 67, St. Marks, Florida 1943
Glenn, Robert W., 509 Orchard Ave., Avalon, Pittsburgh 2, Pennsylvania.1934
**Glover, Ray J[ames], R.D. 1, Addison, Pennsylvania 1943
Gloyd, Howard K[ay], Chicago Academy of Sciences, 2001 N. Clark St., Chicago 14, Illinois 1925
**Goetz, Christian John, 3503 Middleton Ave., Cincinnati 20, Ohio 1930
Good, Ernest E[ugene], Route 1, Van Wert, Ohio 1937
Goodman, John David, 204 W. Grimes St., Fairfield, Iowa 1944
*Goodridge, Edwin Tyson, Province Line Rd., Princeton, New Jersey ...1944
*Gordon, J[esse] Halford, 139 East Second Ave., Roselle, New Jersey 1942
*Goslin, Charles R[ussell], 726 E. King St., Lancaster, Ohio 1940
Goslin, Robert M[artin], 316 Wilson Ave., Columbus 5, Ohio 1936
**Gough, William McDonald, 28 Baby Point Rd., Toronto, Canada 1944
*Gram, Margaret Edwards (Mrs. H. James Gram, Jr.), 409 Notre Dame Rd., Grosse Pointe 30, Michigan 1941
Grannis, Harriet Dudley (Mrs. J. Kidwell), Flemingsburg, Kentucky 1944
Granrud, Capt. Walter Hjalmer, McNair Hall, Box 58, Fort Sill, Oklahoma 1941
*Grant, Cleveland P[utnam], 245 Davis St., Mineral Point, Wisconsin ..1928
Graves, Miss Katherine [Cynthia], 1209 North Illinois St., Apt. 28, Indianapolis 2, Indiana 1942
*Gray, William Arthur, Room 646, 224 S. Michigan Ave., Chicago 14, Illinois 1938
Greeley, Fred[erick], 1121 Rutledge St., Madison, Wisconsin 1942
Green, N[orman] Bayard, Training School, Marshall College, Huntington, West Virginia 1943
Green, Miss Rhoda J[anet], Science Museum, Minneapolis Public Library, Minneapolis 3, Minnesota 1940
**Greene, Albert E., 517 Oswego St., Ann Arbor, Michigan 1939
Greene, Earle R[osenbury], 22 Virginia Court, New Orleans 19, Louisiana.1930
Greenhalgh, Clifton M., Kanab, Kane Co., Utah 1939
*Gregory, Stephen S[trong] Jr., Box N, Winnetka, Illinois 1922
Griffin, Donald R[edfield], Biological Laboratories, Harvard University, Cambridge, Massachusetts 1941

Grimes, S[amuel] A[ndrew], 825 S. Shores Rd., Jacksonville 7, Florida ..1924
*Grimm, William C[arey], P.O. Box 424, Linesville, Pennsylvania 1939
*Grinnell, Lawrence I[rving], 710 Triphammer Rd., Ithaca, New York ..1939
*Griscom, Ludlow, Museum of Comparative Zoology, Cambridge 38, Massachusetts 1937
Griswold, J. A., Address unknown 1941
Grose, E. R., Sago, West Virginia 1939
Groskin, Horace, 210 Glenn Road, Ardmore, Pennsylvania 1937
*Gross, Alfred Otto, 11 Boody St., Brunswick, Maine 1927
*Grossenheider, Richard P., 5415 Gilmore Ave., St. Louis, Missouri 1941
*Guelf, George F., Brockport, New York 1944
*Gunderson, Harvey Lorraine, % H. H. Gunderson. Gary, Minnesota 1941
Gunn, Maj. William H., Longue Pointe, Ordnance Depot, Montreal, P.Q., Canada 1945
Hadeler, Miss Catherine Wilma, 900 Harmon Ave., Dayton 9, Ohio 1945
*Hadley, Thomas E., 48 Wellesley Dr., Pleasant Ridge, Michigan 1944
Haecker, Frederick Woods, 506 S. 52nd St., Omaha, Nebraska 1938
*Hagar, Mrs. Jack, Box 339, Rockport, Texas 1930
*Hague, Florence S., Sweet Briar College, Sweet Briar, Virginia 1931
Haight, Robert Duane, 2035 Bay Shore Blvd., Rochester 9, New York...1945
Haines, T. P., Biology Department, Mercer University, Macon, Georgia ..1941
*Hainsworth, William P[ickard], 216 Railroad Ave., North Andover, Massachusetts 1930
Hall, Lt. Fred T., Fabius, New York 1937
Haller, Frank D[enver], 125 S. Second St., Coshocton, Ohio 1940
*Hallman, Roy Cline, Box 826, Panama City, Florida 1928
*Hamerstrom, Lt. Frederick N. Jr., 6th Alt. Trg. Unit, 235th AAF Bu., Biggs Field, El Paso, Texas 1934
*Hamilton, William J[ohn] Jr., Department of Zoology, Cornell University, Ithaca, New York 1933
Hammond, Merrill C[lyde], Upham, North Dakota 1939
Hampe, Irving E., 5559 Ashbourne Rd., Halethorpe, Baltimore 27, Maryland 1945
*Handlan, John Welty, 409 41st St., S.E., Charleston 4, West Virginia ..1932
*Handley, Charles Overton, Virginia Polytechnic Institute, Blacksburg, Virginia 1925
*Handley, Charles Overton Jr., Blacksburg, Virginia 1941
*Hann, Harry W[ilbur], Department of Zoology, University of Michigan, Ann Arbor, Michigan 1930
Hanna, Wilson Creal, 141 East F. St., Colton, California 1936
Hanson, E[lmer] C[harles], 1305 Wisconsin Ave., Racine, Wisconsin 1940
Happ, George Bippus, Principia College, Elsah, Illinois 1935
Hardy, [Cecil] Ross, Dixie Junior College, St. George, Utah 1940
*Harkness, Reed B., 4908 Laclede Ave., St. Louis 8, Missouri 1942
*Harper, Francis, 224 S. Chester Rd., Swarthmore, Pennsylvania 1930
Harrell, Byron Eugene, 1594 Stanford Ave., St. Paul, Minnesota 1943
Harrell, Frank Ridlen, Museum Libraries, University of Michigan, Ann Arbor, Michigan 1936
**Harriot, Samuel C[arman], 200 W. 58th St., New York City 19 1934
Harrison, H[arold] H[olmes], The Valley Daily News, Tarentum, Pennsylvania 1941
*Hart, Frank Elmer, 2499 Medary Ave., Columbus 2, Ohio 1943
Hartley, Albert Thomas, Columbiana, Ohio 1944
*Hartman, Frank A[lexander], Hamilton Hall, Ohio State University, Columbus, Ohio 1941
*Hartwell, Arthur M[owry], 1506 Mt. Curve, Minneapolis, Minnesota ..1940

*Haskin, J[oseph] R[obert], Box 65, Babson Park, Florida 1944
Haskins, Mrs. Edith D., 39 Park St., Hanover, New Hampshire 1941
Hausler, Mrs. M., 7348 Paxton Ave., Chicago, Illinois 1936
**Havemeyer, Henry O[sborne], Mahwah, New Jersey 1930
*Hawkins, Arthur S., Reg. Sta. Hosp., AAAF, Amarillo, Texas 1936
Hawkins, B. L., Hamline University, St. Paul 4, Minnesota 1936
Hawksley, Mrs. Janet P., 123 Lafayette Circle, Cincinnati, Ohio 1942
**Hebard, Frederick V[anuxem], 1500 Walnut St. Bldg., Philadelphia 2, Pennsylvania 1940
Hedges, Harold C[harles], Route 2, Lake Quivira, Kansas City, Kansas ..1940
*Hefley, Harold M[artin], Department of Biology, Texas Technological College, Lubbock, Texas 1942
Heft, Orvil F., 15790 Lindsay, Detroit 27, Michigan 1945
*Heidenkamp, Joseph, Jr., 538 Glen Arden Drive, Pittsburgh 8, Pennsylvania 1942
Heiser, J[oseph] M[atthew] Jr., 1724 Kipling St., Houston, Texas 1939
*Hendrickson, George O[scar], Department of Zoology, Iowa State College, Ames, Iowa 1933
*Henry, C. J., Lower Souris Refuge, Upham, North Dakota 1933
Henwood, Mrs. Ethel May, 609 W. Ohio St., Urbana, Illinois 1941
**Hewitt, Oliver H[arold], Lands Parks and Forest Branch, Department of Mines and Resources, Ottawa, Ontario, Canada 1943
*Hickey, J[oseph] J[ames], Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1940
***Hicks, Lawrence Emerson, Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1925
Hiett, Lawrence D[avison], 1945 Ottawa Drive, Toledo 6, Ohio 1929
*Higgins, Harold G[uymon], 352 N. 1st E., Price, Utah 1941
Hill, Herbert Oliver, 61-63 Irving Place, New York City 3 1938
Hill, Julian Werner, 1106 Greenhill Ave., Wilmington 56, Delaware 1935
Hill, Raymond W., 3316 Kenmore Rd., Shaker Heights, Cleveland 22, Ohio 1941
*Hill, Walter P., 409 South 6th Ave., La Grange, Illinois 1939
*Hillmer, Davis B., 8228 Woodward Ave., Detroit 2, Michigan 1926
*Hilton, Dr. David C[lark], 305 Continental Bldg., Lincoln, Nebraska ...1918
*Hinds, Frank J., Biology Department, Western Michigan College of Education, Kalamazoo, Michigan 1935
Hindwood, K. A., Wingello House, Angel Place, Sydney, Australia 1945
*Hinshaw, Thomas D[oane], 1827 San Juan Ave., Berkeley 7, California..1926
Hobson, Dorothy Madden (Mrs. L. G.), 1309 N. Penn, Apt. 39, Indianapolis 2, Indiana 1935
*Hochbaum, Hans Albert, Delta, Manitoba, Canada 1942
*Hoff, Clayton M., 810 Blackshire Rd., Wilmington, Delaware 1943
Hoffman, Paul William, 8415 Kenyon Ave., Wauwatosa 13, Wisconsin ..1940
Hoffmeister, Linus C[hristian], 504 W. Ripa Ave., Lemay 23, Missouri..1939
Hofslund, Pershing B[enard], Milaca, Minnesota 1944
*Holland, Harold May, Box 615, Galesburg, Illinois 1915
Holsen, James N., 444 Clark Ave., Kirkwood 22, Missouri 1944
Horner, William A[rchibald], Address unknown 1943
Horton, Louise D. (Mrs. M. B.), 360 Prospect St., Fall River, Massachusetts 1941
Hostetter, D[avid] Ralph, Eastern Mennonite School, Harrisonburg, Virginia 1937
Hotchkiss, Neil, Patuxent Research Refuge, Bowie, Maryland 1940
Hough, Mrs. Eleanor Sloan, 4820 Olentangy Blvd., Columbus, Ohio 1941

Howard, William J[ohnston], 5518 Fairglen Road, Chevy Chase 15, Maryland 1940
Howe [Henry] Branch Jr., 414 W. Ponce de Leon Ave., Decatur, Georgia.1943
Howell, Joseph C[orwin], Department of Zoology, Oklahoma A & M College, Stillwater, Oklahoma 1938
Hoyt, George B[rown], 2603 Habersham Rd., Atlanta, Georgia 1941
*Hoyt, J[ohn] Southgate Y[eston], 820 W. Third St., Williamsport 15, Pennsylvania 1936
*Hughes, George Thomas, R.F.D. 2, Plainfield, New Jersey 1929
**Hughes, Dr. W. W., Embro, Ontario, Canada 1944
Hulbert, Lloyd Clair, 529 West Grand River Ave., East Lansing, Michigan 1938
*Hunt, Ormond Edson, General Motors Bldg., 3044 West Grand Blvd., Detroit 2, Michigan 1937
Hurley, John B[eatty], 401 S. 17th Ave., Yakima, Washington 1937
Hurst, John W. Jr., 522 S. 6th St., Bozeman, Montana 1945
Hutchinson, Arthur E., 715 Mission Canyon Rd., Santa Barbara, California 1940
Hyde, Lt. A[rthur] Sidney, 4th Photo Procurement Det., A.P.O. 925, San Francisco, California 1939
Hyder, Albert E., Department of Botany, Ohio State University, Columbus 10, Ohio 1945
Ingersoll, Albert M[ills], 908 F Street, San Diego 1, California 1921
**Ingersoll, Marion C[rory] (Mrs. Raymond V.), 4 East 66 St., New York City 21 1942
Ivor, H. Roy, Route 1, Cooksville, Ontario, Canada 1945
*Jackson, C[icero] F[loyd], Director of Biological Institute, University of New Hampshire, Durham, New Hampshire 1936
*Jackson, Francis Lee, 541 Hammond St., Chestnut Hill, Massachusetts ..1941
Jameson, Everett Williams Jr., 179 Highland Ave., Buffalo, New York ..1941
*Janvrin, Edmund R[andolph] P[easlee], 38 E. 85th St., New York City.1942
Jaques, F[rancis] L[ee], 610 West 116 St., New York City 27 1939
Jaquith, Barbara Elizabeth (Mrs. L. E.), 72 Hudson Dr., Toronto 5, Ontario, Canada 1943
Jenkins, James H[obart], 1204 W. Chestnut, Mt. Vernon, Ohio 1939
*Jenner, William, 806 W. Davis St., Fayette, Missouri 1933
*Johnson, Clifford O., 987 Fourteenth St., Marion, Iowa 1944
*Johnson, Mrs. Oscar, 38 Portland Place, St. Louis, Missouri 1931
Johnson, Perry Frank, 2918 S. Anthony Blvd., Fort Wayne 5, Indiana ..1935
*Johnson, Robert A[nthony], 150 East St., Oneonta, New York 1930
Johnson, William M[cNutt], Route 4, Knoxville, Tennessee 1939
Johnston, Miss Verna R[uth], Stockton Junior College, Stockton, California 1941
*Jonah, Miss Christie May, 221 Anderson St., Hackensack, New Jersey ..1942
*Jones, Harold C[harles], Thomas Berry College, Mount Berry, Georgia ..1929
Jones, John C[ourts], 718 Garfield St., Eveleth, Minnesota 1931
****Jones, Lynds, 352 W. College St., Oberlin, Ohio ....Founder
*Jones, S[olomon] Paul, 509 West Ave., N., Waukesha, Wisconsin 1921
Jones, Victor E[mmons], University of Idaho, Southern Branch, Pocatello, Idaho 1938
Jorae, Miss Irene Frances, Central Michigan College of Education, Mt. Pleasant, Michigan 1942
Jorns, Byron C[harles], 3275 Gregory St., Madison, Wisconsin 1943
*Jung, Clarence [Schram], 6383 N. Port Washington Rd., Milwaukee 9, Wisconsin 1921
Jurica, E., Lisle, Illinois 1940

Kahmann, Karl W., Route 2, Hayward, Wisconsin 1941
Kahn, Dina H[ope] (Mrs. Reuben L.), 1122 Michigan Ave., Ann Arbor, Michigan 1938
*Kalmbach, Edwin Richard, Fish & Wildlife Service, 546 Custom House, Denver 2, Colorado 1926
*Kase, John C[harles], Versailles, Indiana 1937
Kautz, Lorin G., White River Refuge, St. Charles, Arkansas 1944
*Keating, F[rancis] Raymond Jr., 519 5th Ave., S.W., Rochester, Minnesota 1944
*Keck, Warren N., Coe College, Cedar Rapids, Iowa 1944
*Kelker, George Hills, School of Forestry, U.S.A.C., Logan, Utah 1938
**Keller, Lt. Richard T[homas], 717 S. 16th St., St. Joseph, Missouri 1943
Kelly, Evelyn (Mrs. George A.), 2300 North LaSalle Gardens, Detroit 6, Michigan 1935
*Kelsey, Homer Stone, Box 402, Nyack, New York 1945
*Kelso, Leon H[ugh], 1370 Taylor St., N.W., Washington 11, D.C. 1930
Kemp, John H. Jr., 232 Circle Ave., Ridgewood, New Jersey 1945
Kendall, Mrs. Herbert E., 7 Ayer St., Nashua, New Hampshire 1945
*Kendeigh, S[amuel] Charles, Vivarium Bldg., University of Illinois, Champaign, Illinois 1923
Kendrick, Miss Muriel Sherburn, 201 Pleasant St., Laconia, New Hampshire 1945
Kerr, Mrs. Mary Helen, 1290 Delaware, Springfield, Missouri 1943
Key, Mrs. J. Frank, Buena Vista, Virginia 1945
Kiefer, Elizabeth D[eyo] (Mrs. Francis), 243 Gratiot Blvd., Port Huron, Michigan 1941
*Kieran, John, 4506 Riverdale Ave., New York City 63 1942
Kindler, Mrs. Grace E[mma], Sheridan Drive, Route 1, Lancaster, Ohio.1937
Kirby, Edward Vincent, 5259 Union Ave., Chicago 9, Illinois 1945
Kirk, Allan D[ixon], 14 Forest Hill Road, Wilkinsburg, Pennsylvania ..1939
*Klinkerfuss, Mrs. G. H., 340 Bermuda Ave., Normandy, Missouri 1941
*Klinkerfuss, Dr. G. H. 340 Bermuda Ave., Normandy, Missouri 1941
Kluge, Miss Helen H[enrika], Woodtick Road, Waterbury 63, Connecticut 1942
*Knapp, Elmer Leslie, R.F.D. 2, Troy, Pennsylvania 1930
Knollmeyer, Capt. Lewis Edward, University of Wisconsin, Sterling Hall, Madison, Wisconsin 1945
Knox, Miss Margaret R[ichardson], 4030 Park Ave., Indianapolis 5, Indiana 1937
Koch, Peter, Cincinnati Museum of Natural History, Cincinnati 10, Ohio.1939
Koehler, Mrs. Arthur, 109 Chestnut Street, Madison, Wisconsin 1941
Koestner, E. J., Box 263 Piper City, Illinois 1938
Kolb, C[harles] Haven Jr., 5021 Midwood Ave., Baltimore 12 , Maryland.1937
Korgen, Miss Mollie, 1919 East 3rd St., Duluth 5, Minnesota 1944
**Kortright, Francis H[erbert], 5 St. Edmunds Dr., Toronto, Ontario, Canada 1943
Kossack, Charles W., 715 S. Division St., Barrington, Illinois 1945
Kramer, Theodore C[hristian], Department of Anatomy, East Medical Bldg., Ann Arbor, Michigan 1939
Kraus, Douglas L[awrence], Princeton, Massachusetts 1942
Kreag, Keith K., Route 2, Box 196, Lansing, Michigan 1942
Kritzler, Lt. Henry, 3627 216th St., Bayside, New York 1945
Krug, Howard H[enry], Chesley, Ontario 1944
*Krutzsch, Miss Barbara Ellen, 3025 Meridian St., Apt. 401, Indianapolis, Indiana 1945
Kuitert, Capt. Louis Cornelius, 706 Florence St., Kalamazoo, Michigan.1938

*Kutz, George Carl, 705 S. Holcombe St., Stillwater, Minnesota 1944
*Kutz, Harry Leon, Chaumont, New York 1939
*Kyllingstad, Henry C[arrell], Mountain Village, Alaska 1940
*Lacey, George Macrae, 121 S.E. 13th St., Miami, Florida 1945
Lacey, Miss Mifton H., Box 614, Canton, Ohio 1939
Laffoon, Jean Luther, 1401 W. 3rd, Sioux City, Iowa 1940
Lagler, Karl F., Department of Zoology, University of Michigan, Ann Arbor, Michigan 1941
***Lambert, Bert H., 16854 Wildemere Ave., Detroit, Michigan 1936
*Lambert, Robert John Jr., 2802 Kenmore Ave., Dayton, Ohio 1945
Lanyon, Wesley E[dwin], 23 E. Wheelock St., Hanover, New Hampshire.1943
*La Rivers, Ira, P.O. Box 1493, Reno, Nevada 1945
*Larrabee, Austin Park, Yankton College, Yankton, South Dakota 1921
Larson, Capt. Goodman Kenneth, 1611 Ashland Ave., St. Paul, Minnesota 1945
*Laskey, Amelia Rudolph (Mrs. Frederick Charles), Graybar Lane, Nashville 4, Tennessee 1928
Lattin, Jack Daniel, 5726 W. Ohio St., Chicago, Illinois 1945
Lawrence, William Hobart, 1410 Decatur St., N.W., Washington 11, D.C..1943
Lay, Daniel Wayne, % Game, Fish and Oyster Commission, Austin, Texas.1939
Lea, Robert B[ashford], 24 North Worth Ave., Elgin, Illinois 1940
Lee, Maj. Howard J[ames], U.S. Army Hospital, Camp Carson, Colorado Springs, Colorado 1941
Leedy, Daniel L[ovey], Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1936
Leenhouts, Miss Pearle Esther, Pease Road, Williamson, New York 1941
Legg, William C[larence], Mt. Lookout, West Virginia 1939
*Leopold, Aldo, 424 University Farm Place, University of Wisconsin, Madison 6, Wisconsin 1928
Leopold, A[ldo] Starker, Monte Libano 640, Mexico D.F., Mexico 1940
Levy, Alice K[lund] (Mrs. H. P.), 235 East 22nd St., Apt. 11T, New York City 10 1941
*Lewis, Harrison Flint, Lands, Parks and Forest Branch, Department of Mines and Resources, Ottawa, Ontario, Canada 1939
Lewis, Brother Hubert, Cretin High School, St. Paul, Minnesota 1940
*Lewy, Alfred, 2051 East 72nd Place, Windsor Park Station, Chicago, Illinois 1915
Lieftinck, John E., 80 Byers Ave., Akron 3, Ohio 1945
Lincoln, Frederick Charles, Fish and Wildlife Service, Washington, D.C..1914
Lindzey, James S[hotwell], 901 West 22nd St., Wilmington, Delaware..1942
*Linsdale, Jean M[yron], Jamesburg Route, Monterey, California 1928
Linton, M[orris] Albert, 315 E. Oak Ave., Moorestown, New Jersey 1941
*Literaty, Miss Nadine M., 2129 Brown Road, Lakewood 7, Ohio 1945
Livergood, Elmer, 271 Harvard Blvd., Steubenville, Ohio 1945
Lloyd C[lark] K., 11 North Elm St., Oxford, Ohio 1925
*Lloyd, Hoyes, 582 Mariposa Ave., Rockcliffe Park, Ottawa, Ontario, Canada 1922
Lockley, R. M., Skokholm Bird Observatory, Dale, Haverfordwest, Pembrokeshire, Wales, Great Britain 1940
Lodge, William R[alph], Route 3, Box 1, Cuyahoga Falls, Ohio 1935
Long, Chester, 39 N. Kealing Ave., Indianapolis 1, Indiana 1943
Longley, William H[oward], 334 S. Albert Ave., St. Paul 5, Minnesota ..1943
Loop, George Andrew, 205 S. Keystone Ave., Sayre, Pennsylvania 1944
Lord, Frederick P[omeroy], 39 College St., Hanover, New Hampshire..1939
Lovell, Harvey B., 3011 Meade Ave., Louisville 4, Kentucky 1936
*Low, Seth Haskell, Box 253, Cherokee, Oklahoma 1931

***Lowery, George H[ines] Jr., Museum of Zoology, Louisiana State University, University, Louisiana 1937
*Lowther, Malcolm Alfred, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1944
*Ludwig, Claud C[ecil], 506 Wilson Bldg., Lansing, Michigan 1938
Ludwig, Dr. Frederick Edwin, U.S. Naval Hospital, Portsmouth, Virginia.1941
Lum, Miss Elizabeth C[aroline], Box 355, College Park, Maryland 1940
*Lunk, William Jr., 29 Bell Run Road, Fairmont, West Virginia 1937
Lupient, Miss Mary L[ouise], 212 S. E. Bedford St., Minneapolis, Minnesota 1944
*Luthy, Ferd Jr., 306 N. Institute, Peoria, Illinois 1937
*Lyman, Clara Cross (Mrs. Frederick C.), 1716 Colfax Ave., S., Minneapolis, Minnesota 1944
MacArthur, John Wood Jr., 200 Glencairn Ave., Toronto, Ontario, Canada 1941
MacDonald, Donald L[aurie], 72 Alexandra Blvd., Toronto, Ontario, Canada 1941
MacLean, Miss Dorothy W[illiams], 21 Ashley St., Hartford, Connecticut 1939
*MacLulich, D[uncan] A[lexander], 144 Mavety St., Toronto, Ontario, Canada 1933
*MacMullan, Capt. R[alph] Austin, 28321 Ford Road, Garden City, Michigan 1940
*McAtee, Waldo Lee, Fish and Wildlife Service, Merchandise Mart, Chicago 54, Illinois 1911
McCabe, Robert A[lbert], 424 University Farm Place, Madison, Wisconsin 1942
McCamey, Lt. Benjamin Franklin Jr., 301 E. Yale, Orlando, Florida ..1945
*McClary, Miss Susan C., North Main St., Windsor, Vermont 1945
McClure, H[owe] Elliott, 1609 P Street, Ord, Nebraska 1942
*McCormack, Richard John, 815 W. Breckenridge, Ferndale, Michigan..1945
*McCue, Earl Newlon, Box 104, Morgantown, West Virginia 1941
*McCullagh, E[rnest] Perry, 2020 E. 93rd St., Cleveland, Ohio 1937
McDonald, Malcolm, P.O. Box 42, Ann Arbor, Michigan 1936
*McGaw, Mrs. G. Hampton, 18 Beech St., Woodsville, New Hampshire ..1945
McGeen, Daniel S., 144 Garfield Ave., Waukesha, Wisconsin 1944
McGraw, Harry A[rthur], 1600 5th Ave., Altoona, Pennsylvania 1936
***McIlhenny, Edward Avery, Avery Island, Louisiana 1910
McIntosh, William B[axter], 414 Oakridge Blvd., Lynchburg, Virginia ..1942
McKeever, Otto Donald, Box 143, Rensselaer, Indiana 1943
McKinley, George G., 104 North Western Parkway, Louisville 12, Kentucky 1945
McKinney, Mrs. Walter A., 244 East 29th St., Tulsa 5, Oklahoma 1945
*McKnight, Edwin T[hor], 5038 Park Place, Friendship Station, Washington, D.C. 1936
*McMath, Robert R., Route 4, Pontiac, Michigan 1934
McMurray, Arthur A., 2110 Fairfax Ave., Nashville 5, Tennessee 1939
McMurry, Frank B[ailey], Box 1032, Yuma, Arizona 1939
McNish, Edgar Mann, Madison, Tennessee 1940
Mace, Miss Verna M[arie], Department of Physiology, Veterinary Bldg., Colorado State College, Fort Collins, Colorado 1943
Mack, H[orace] G[ordon], % Gilson Mfg. Co., Ltd., Guelph, Ontario, Canada 1937
Magath, Thomas Byrd, Mayo Clinic, Rochester, Minnesota 1935
*Magee, Michael J[arden], 603 South St., Sault Ste Marie, Michigan 1919
Magney, Mrs. G. R., Scandia, Minnesota 1940

Malley, Philip P., 114 Glendale Rd., Upper Darby, Pennsylvania 1935
Manners, Edward Robert, 216 New Broadway, Brooklawn, New Jersey..1942
Manville, Richard H[yde], Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1941
*Margolin, A[braham] S[tanley], Oglebay Hall, Morgantown, West Virginia 1944
Markle, Jess Matthew, Route 3, Box 336A, Madera, California 1943
Marshall, [Harry] Morton, Route 1, Pamplin, Virginia 1944
Marshall, Raymond O., Route 2, Columbiana, Ohio 1945
*Marshall, Terrell, 372 Skyline Drive, Park Hill, North Little Rock, Arkansas 1944
Marshall, William H[ampton], Division of Entomology and Economic Zoology, University Farm, St. Paul 8, Minnesota 1942
**Martin, John E. H., Ancaster, Ontario, Canada 1944
*Maslowski, Karl H[erbert], 1034 Macliff Place, Cincinnati 30, Ohio ..1934
Mason, Miss Esther, 2523 Montgomery St., Louisville 12, Kentucky 1941
Mathiak, Harold A[lbert], Horicon, Wisconsin 1941
*Mayfield, G[eorge] R[adford], Vanderbilt University, Nashville, Tennessee 1917
*Mayfield, Harold F[ord], 3311 Parkwood Ave., Toledo, Ohio 1940
***Mayr, Ernst, American Museum of Natural History, 79th St. & Central Park West, New York City 24 1933
Mead, Frank W[aldreth], 227 Brighton Rd., Columbus, Ohio 1941
Meade, Gordon M[ontgomery], Strong Memorial Hospital, 260 Crittenden Blvd., Rochester, New York 1937
Mellinger, E[nos] O[ren], North Lima, Ohio 1939
Meltvedt, Burton W., Paullina, Iowa 1930
Mendall, Howard L[ewis], 28 Pendleton St., South Brewer, Maine 1936
Meng, Heinz Karl, 116 Miller St., Ithaca, New York 1943
Mengel, Robert Morrow, % Arthur D. Allen, Glenview, Kentucky 1937
Meritt, James Kirkland, 99 Battle Rd., Princeton, New Jersey 1944
***Merry, Miss Katherine, General Delivery, Wenatchee, Washington 1944
Meryman, Richard S., Groton School, Groton, Massachusetts 1945
Messner, Clarence John, 308 McKinley, Grosse Pointe 30, Michigan 1944
**Metcalf, H[omer] N[oble], Box 175, Harvey, Illinois 1944
*Metcalf, Zeno P[ayne], State College Station, Raleigh, North Carolina ..1900
*Meyer, Henry, Zoology Department, University of Tennessee, Knoxville, Tennessee 1939
Michaud, Howard H[enry], 824 N. Main St., West Lafayette, Indiana ..1938
*Michener, Harold, 418 North Hudson Ave., Pasadena 4, California 1926
*Miles, Merriam Lee, Box 709, Vicksburg, Mississippi 1941
Miles, Eleanor B. (Mrs. Philip E.), 1900 Arlington Place, Madison 5, Wisconsin 1943
Miller, Alden H[olmes], Museum of Vertebrate Zoology, Berkeley 4, California 1930
Miller, Mrs. Alice, 2200 Belmont, Dearborn, Michigan 1944
Miller, Mrs. Clarence Heath, 1354 Herschel Ave., Cincinnati 8, Ohio 1941
*Miller, Douglas Scott, 122 Lawrence Ave. E., Toronto, Ontario, Canada ..1939
Miller, Loye H[olmes], University of California, 405 Hilgard Ave., Los Angeles 24, California 1939
Miller, Raymond Foster, Baker University, Baldwin City, Kansas 1945
Miller, Richard F[ields], 2627 N. 2nd St., Philadelphia 33, Pennsylvania.1942
Mills, Robert H[enry], 2466 Medary Ave., Columbus 2, Ohio 1941
Milnes, Miss Hattie K[ernahan], 331 Gowen Ave., Mt. Airy, Philadelphia 19, Pennsylvania 1935
*Minich, Edward C., 1047 Fairview Ave., Youngstown 2, Ohio 1923

*Mitchell, Harold Dies, 378 Crescent Ave., Buffalo, New York 1936
Mitchell, Mrs. R. V., Four Winds Farm, Route 1, Canton, Ohio 1943
*Mitchell, Mrs. Osborne, Route 1, Streetsville, Ontario, Canada 1933
**Mitchell, Walton I[ungerich], 398 Vassar Ave., Berkeley 8, California ..1893
Moeran, E[dward] H[enry], 541 Bronx River Road, Yonkers, New York..1940
Mohler, Levi L[app], 716 S. 18th St., Lincoln, Nebraska 1942
**Monk, Lt. Harry C[rawford], 406 Avoca St., Nashville 5, Tennessee 1920
*Monroe, Burt L[eavelle], Ridge Rd., Anchorage, Kentucky 1935
*Monson, Gale, 2728 E. Helen St., Tucson, Arizona 1933
*Moore, Miss Dora, 60 E. Mulberry St., Athens, Ohio 1934
Moore, George A[zro], 289 Admiral Rd., Stillwater, Oklahoma 1928
Moore, George M[itchell], Nesmith Hall, University of New Hampshire, Durham, New Hampshire 1942
Moore, Miss Jeanne [Ellen], 718 Onondaga St., Ann Arbor, Michigan ...1943
Moore, Miss Laura Brooks, French Creek, West Virginia 1941
Moore, Robert Thomas, Route 1, Box 28A, Pasadena, California 1939
Moran, James Vincent, 1 Alfred St., Jamaica Plain, Boston 30, Massachusetts 1943
Morgan, Allen Hungerford, Cochituate Road, Wayland, Massachusetts...1943
Morrell, Charles K., 119 E. Maxwell St., Lexington, Kentucky 1943
Morrell, Miss Elsie, 1311 White Ave., Knoxville 16, Tennessee 1942
*Morse, Margarette Elthea, 11501 Mayfield Rd., Cleveland 6, Ohio 1921
*Moseley, Edwin Lincoln, University Museum, Bowling Green, Ohio 1925
*Moser, Edward Randolph, Aberdeen, Idaho 1944
**Moser, R[euben] Allyn, R.F.D. 1, Benson Station, Omaha 4, Nebraska..1940
Moul, Edwin Theodore, 4 Hill St., York, Pennsylvania 1942
*Mousley, William H[enry], 4073 Tupper St., Westmount, Montreal, Canada 1922
**Mudge, Edmund W. Jr., 4105 Averill Way, Dallas, Texas 1939
Mueller, Walter J[osef], 3043 N. Prospect Ave., Milwaukee, Wisconsin..1936
*Muirhead, Miss Peggy, Carleton College, Northfield, Minnesota 1940
Munro, J[ames] A[lexander], Okanagan Landing, British Columbia, Canada 1935
*Munter, Rear Admiral W[illiam] H[enry], 4518 52nd Ave., N.E., Seattle 5, Washington 1933
Murdock, James Ingram, 311 Irving Ave., Glendale 1, California 1940
*Murie, Adolph, Jackson, Wyoming 1932
*Murie, O[laus] J[ohan], Jackson, Wyoming 1934
Murphey, Eugene Edmund, 432 Telfair St., Augusta, Georgia 1935
*Murphy, Paul C[harles], 935 Goodrich Ave., Apt. 10, St. Paul 5, Minnesota 1944
Murray, Rev. J[oseph] J[ames], 6 White St., Lexington, Virginia 1931
Musselman, T[homas] E[dgar], 124 South 24th St., Quincy, Illinois 1940
**Myers, Frank M[arcel], Section C-2, Bhs. 820, L.A.A.F., Laredo, Texas..1944
Nash, Lt. Nathaniel C[ushing] IV, 1 Reservoir St., Cambridge, Massachusetts 1941
*Neff, Johnson Andrew, 546 Custom House, Denver, Colorado 1920
*Nelson, Arnold Lars, 3256 Van Hazen St., N.W., Washington, D.C. 1932
Nelson, Charles E[llsworth] Jr., 124 Oxford Rd., Waukesha, Wisconsin..1937
Nelson, Edwin L[ewis], 77 Adelaide Ave., New Brunswick, New Jersey..1939
Nelson, Mrs. Esther Marie, 515 E. Minnehaha Parkway, Minneapolis 9, Minnesota 1945
***Nelson, Miss Theodora, 315 East 68th St., New York City 21 1928
Nelson, Urban C., Soil Conservation Service, Stillwater, Minnesota 1939
Netting, M[orris] Graham, Carnegie Museum, Pittsburgh 13, Pennsylvania 1941

Nevius, Mrs. Richard, Route 1, Greenville, Tennessee 1940
*Newlin, Lyman W., Deephaven Park, Route 3, Wayzata, Minnesota ..1945
Newman, Barnett, 343 East 19th St., New York City 3.....1942
Newton, Earl T[homas], 5500 College St., Kansas City 4, Missouri 1939
*Nice, L[eonard] B., 5725 Harper Ave., Chicago 37, Illinois 1932
*Nice, Mrs. Margaret Morse, 5725 Harper Ave., Chicago 37, Illinois 1921
*Nichols, Charles K[etcham], 212 Hamilton Road, Ridgewood, New Jersey 1933
Nichols, John Treadwell, American Museum of Natural History, 79th St. and Central Park West, New York City 24 1941
*Nichols, L[eon] Nelson, 331 East 71st St., New York City 1937
Nicholson, Donald J., 1224 Palmer St., Orlando, Florida 1945
Nicholson, Wray H., 2520 Depauw St., Orlando, Florida 1945
*Nickell, Walter Prine, Cranbrook Institute of Science, Bloomfield Hills, Michigan 1943
*Nielsen, Mrs. G. W., Tiffin, Ohio 1945
Nirenberg, Marshall Warren, Route 2, Box 114, Orlando, Florida 1945
Nordquist, Lt. Theodore C., 1423 James Ave., N., Minneapolis 11, Minnesota 1941
Noren, Oscar B., 16241 Inverness, Detroit 21, Michigan 1945
Norris, Robert Allen, 505 W. 8th St., Tifton, Georgia 1941
Norris, Russell T[aplin], Route 7, Butler, Pennsylvania 1939
*Norse, William J[ohn], 531 West 211th St., New York City 34 1939
North, George W[ebster], 249 Charlton Ave., W., Hamilton, Ontario, Canada 1941
*Northrop, Myron, 7932 Delmar, University City 5, Missouri 1945
Norton, Mrs. Margaret E[astman], 2206 Sheffield Dr., Kalamazoo, Michigan 1944
Nyc, Fred[erick] F[rancis] Jr., Box 869, Brownsville, Texas 1943
*Oberholser, Harry Church, Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland 15, Ohio 1894
*O'Conner, Miss Esther [Laura], 4344 Locust Ave., Kansas City 4, Missouri 1940
*Odum, Eugene P[leasants], Department of Zoology, University of Georgia, Athens, Georgia 1930
Oliver, Miss Mary C[lara], Ganado Mission, Ganado, Arizona 1934
**Olsen, Humphrey A., Pikeville College Library, Pikeville, Kentucky 1941
Olson, Mrs. Gladys E[lizabeth], 17906 Lake Rd., Lakewood 7, Ohio 1942
Ommanney, G. G., % Post Office, Hudson Heights, Quebec, Canada 1944
*O'Reilly, Ralph A. Jr., 11892 Ohio Ave., Detroit 4, Michigan 1936
**Osborn, Hon. Chase S[almon], Sault Ste Marie, Michigan 1943
*Osgood, W[ilfred] H[udson], Chicago Natural History Museum, Chicago 5, Illinois 1910
*Otis, Charles H[erbert], Department of Biology, Bowling Green State University, Bowling Green, Ohio 1937
Ott, Frederick Louis, 2527 North Wahl Ave., Milwaukee 11, Wisconsin..1941
*Overing, Robert, R.F.D. 4, Raleigh, North Carolina 1930
*Owre, Oscar T., 2625 Newton Ave., S., Minneapolis, Minnesota 1935
Packard, W. H., Address unknown 1944
Painton, Dr. Harry R., P.O. Box 1208, Las Vegas, Nevada 1939
*Palmer, Ralph S[imon], Department of Zoology, Vassar College, Poughkeepsie, New York 1934
*Palmer, T[heodore] S[herman], 1939 Biltmore St., N.W., Washington, D.C. 1914
*Palmquist, Clarence O., 7400 N. Odell Ave., Chicago 31, Illinois 1945
*Parker, Dean Roberts, Texas Technological College, Lubbock, Texas 1944

*Parker, Henry M[elville], 122 School St., Concord, New Hampshire 1941
Parlee, Miss Phyllis Gertrude, Route 4, Mt. Airy, Maryland 1945
Partch, Max L[orenzo], 613 W. Prairie St., Columbus, Wisconsin 1940
*Patterson, Lt. Robert, U.S.S. Clarence K. Bronson, % Fleet P.O., San Francisco, California 1943
Pearson, Miss Dorothy, 19 Lincoln St., North Weymouth, Massachusetts.1944
*Peartree, Edward William, 425 S. State St., Oconomowoc, Wisconsin 1941
*Peasley, Mrs. Harold R[aymond], 2001 Nash Drive, Des Moines, Iowa..1934
Peelle, Miles L., 329 Rice St., Adrian, Michigan 1940
***Peet, Dr. Max Minor, 2030 Hill St., Ann Arbor, Michigan 1935
Penner, Lawrence R., Department of Zoology, University of Connecticut, Storrs, Connecticut 1940
*Perner, Miss Margaret E., 3463 Woodridge Rd., Cleveland Heights 21, Ohio 1943
*Peters, Harold S[eymour], 107 River Rd., Ashley Forest, Charleston, South Carolina 1924
*Peterson, Alfred, Box 201, Brandt, South Dakota 1931
Peterson, Mrs. C[harles] E[mil], Madison, Minnesota 1936
*Peterson, Roger Tory, 1206 Mt. Vernon Blvd., Alexandria, Virginia 1942
Peterson, Stella Freeman (Mrs. Theodore), 80 Oaklawn Ave., Battle Creek, Michigan 1941
Petrides, George A., 112 Forest Ave., Rockville, Maryland 1942
***Pettingill, Olin Sewall Jr., Carleton College, Northfield, Minnesota 1930
**Phelps, William H[enry], Apartado 2009, Caracas, Venezuela 1940
**Philipp, Frederick B[ernard], 99 John St., New York City 1940
*Phillips, Allan Robert, 113 Olive Rd., Tucson, Arizona 1934
*Phillips, Cyrus Eastman, 255 Polk St., Warsaw, Illinois 1944
Phillips, Richard Stuart, 834 Liberty St., Findlay, Ohio 1944
*Pickwell, Gayle B[enjamin], State Teachers' College, San Jose, California.1923
Pieczur, Walter Henry, 1143 Rogers Ave., Brooklyn 26, New York 1945
Pierce, Robert Allen, Nashua, Iowa 1941
*Pirnie, Miles David, W. K. Kellogg Bird Sanctuary, Augusta, Michigan..1928
Pitelka, Frank Alois, Museum of Vertebrate Zoology, University of California, Berkeley 4, California 1938
Pittman, James Allen, 436 S. Osceola, Orlando, Florida 1945
Plath, Karl, 2847 Giddings St., Chicago, Illinois 1942
**Poole, Cecil A[very], 830 Chapman St., San Jose 11, California 1942
*Poor, Hustace Hubbard, 112 Park Ave., Yonkers 3, New York 1935
*Porter, Thomas Wayne, Ohio City, Ohio 1938
*Potter, Julian K[ent], 437 Park Ave., Collingswood, New Jersey 1915
Potter, Louis Henry, R.F.D. 2, West Rutland, Vermont 1941
Potter, Nathan S. III, 2002 Geddes Ave., Ann Arbor, Michigan 1945
*Pough, Richard H[ooper], 33 Highbrook Ave., Pelham 65, New York ...1938
*Powell, Roger Warren, Lincoln Auto Court, Cheyenne, Wyoming 1944
Prather, Millard F[illmore], 1129 Brown-Marz Building, Birmingham 3, Alabama 1940
Pratt, Eva Eldridge (Mrs. Charles H.), Ossipee, New Hampshire 1945
*Preble, Edward Alexander, 3027 Newark St., Washington, D.C. 1929
*Preble, Norman A[lexander], Department of Biology, Bowling Green State University, Bowling Green, Ohio 1941
*Presnall, Mrs. Clifford C[harles], Lake Zurich, Illinois 1930
Price, Homer F., Payne, Ohio 1944
*Prill, Dr. Albert G., Main St., Scio, Oregon 1921
**Procter, William, Bar Harbor, Maine 1937
Prucha, Miss Alma H., 3052 N. Maryland Ave., Milwaukee 11, Wisconsin.1942
*Pueschel, Paul, 520 Drexel Ave., Glencoe, Illinois 1939

Putman, William Lloyd, Dominion Entomological Laboratory, Vineland Station, Ontario, Canada 1945
Putnam, Loren Smith, Department of Zoology, Ohio State University, Columbus, Ohio 1942
*Pyle, George W[inner], S. Valley Rd., Box 604, Paoli, Pennsylvania 1939
Quam, Mrs. Mary Battell, 141 Joralemon St., Brooklyn 2, New York 1944
Quay, Thomas L[avelle], Route 2, Box 34, Van Buren, Arkansas 1939
Quimby, Don C., 4742 Garfield Ave., S., Minneapolis, Minnesota 1942
Ragusin, Capt. Anthony V[incent], Box 225, Pascagoula, Mississippi 1937
Rahe, Carl W., 4666 Turney Road, Cleveland 5, Ohio 1931
Ramsden, Charles Theodore, 8 & 19 Vista Alegre, Santiago, Cuba 1914
Randall, Robert Neal, Georgetown, Colorado 1939
Rapp, William F[rederick] Jr., 203 East Green St., Champaign, Illinois ..1941
*Rebmann, G. Ruhland, Jr., 729 Milbrook Lane, Haverford, Pennsylvania.1941
*Reeder, Miss Clara Maude, 1608 College Ave., Houghton, Michigan 1938
*Reese, Mrs. Hans H., 3421 Circle Close, Shorewood Hills, Madison 5, Wisconsin 1941
Reid, Vincent Howard, 1022 S. 29th St., Omaha, Nebraska 1945
Remington, Charles Lee, 5570 Etzel Ave., St. Louis, Missouri 1944
Rett, Egmont Z[achary], Museum of Natural History, Santa Barbara, California 1940
Rice, Mrs. Harry Wilson, 3940 Richfield Rd., Minneapolis, Minnesota ..1940
Richdale, Lancelot Eric, 23 Skibo St., Kew, Dunedin S.W. 1, New Zealand 1945
**Richman, William, Woodstown, New Jersey 1945
*Ricker, W[illiam] E[dwin], Department of Zoology, Indiana University, Bloomington, Indiana 1943
Riggs, Carl D[aniel], 5312 N. New Jersey St., Indianapolis, Indiana 1943
*Rinehart, Edwin P[aul], 1013 Wyandotte Bldg., Columbus, Ohio 1944
Riner, Miss Alice, 115 S. Estelle, Wichita 7, Kansas 1939
Ring, Mrs. Lonnie Joe, Box 963, Alamo, Texas 1945
Ritchie, R. C., 60 Chatsworth Drive, Toronto, Ontario, Canada 1942
Ritter, Rhys T[heophilus], R.D. 4, Bethlehem, Wheeling, West Virginia..1944
*Roads, Miss Myra Katie, 463 Vine St., Hillsboro, Ohio 1914
Robbins, Chandler S[eymour], Patuxent Research Refuge, Bowie, Maryland 1941
Roberts, Homer D[onald], 1011 Hazel St., Birmingham, Michigan 1943
**Roberts, Thomas S[adler], Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1914
***Rogers, Charles Henry, East Guyot Hall, Princeton, New Jersey 1903
Rogers, Capt. Gerald Talbot, Junior Pilot, Africa-Orient Division, Pan American Airways, Miami, Florida 1945
*Rogers, Irl, 402 Alturas Ave., Modesto, California 1937
*Rogers, Mrs. Walter E., P.O. Box 385, Appleton, Wisconsin 1931
*Rollo, Mrs. W. E., Otis Road, Barrington, Illinois 1942
*Rompf, Mrs. Frank W., Box 925, Alamo, Texas 1945
***Root, Oscar M[itchell], Brooks School, North Andover, Massachusetts ..1940
Rorimer, Irene T. (Mrs. J. M.), % Empire Plow Co., 3140 East 65 St., Cleveland 4, Ohio 1938
Rosene, Walter Jr., 1212 Jupiter, Gadsden, Alabama 1942
*Rosewall, O[scar] W[aldemar], Department of Zoology, Louisiana State University, University, Louisiana 1931
Ross, C[harles] Chandler, 7924 Lincoln Dr., Chestnut Hill, Philadelphia, Pennsylvania 1937
Ross, Hollis T., 29 South 2nd St., Lewisburg, Pennsylvania 1945

*Rudd, Dr. Clayton G[lass], 315 Medical Arts Bldg., Minneapolis, Minnesota 1944
Ruderman, Miss Claire, Department of Biology, University of Rochester, Rochester, New York 1944
Ruecker, Miss Emilie, Seapowet Ave., Tiverton, Rhode Island 1943
*Rysgaard, George Nielson, Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1937
*Sage, Evan V., Route 3, Waterloo, Iowa 1944
Sandve, J[oseph] Reuben, 883 23rd Ave., S.E., Minneapolis, Minnesota ..1943
*Satterthwait, Mrs. Elizabeth Allen, 806 W. Ohio St., Urbana, Illinois 1925
Saugstad, N[els] Stanley, Route 4, Minot, North Dakota 1939
*Saunders, Aretas A[ndrews], 361 Crestwood Rd., Fairfield, Connecticut.1934
*Saunders, George B[radford], Fish and Wildlife Service, 1623 N.W. Washington St., Brownsville, Texas 1926
*Savage, James, Buffalo Athletic Club, Buffalo, New York 1939
Sawyer, Miss Dorothy, R.F.D. 1, Unadilla, New York 1937
Schantz-Hansen, Donald [Ernst], Forestry Station, Cloquet, Minnesota..1944
Schaub, Mary Hall (Mrs. J. B.), 1040 Isabella St., Wilmette, Illinois ..1939
Schierbaum, Miss Ethel, Route 1, Edwardsville, Illinois 1945
Schmidt, Lt. John R., Sqdn. S., Br. 4, L.A.A.F., Lincoln, Nebraska 1945
*Schneider, Miss Evelyn J., University of Louisville, Belknap Campus, Louisville, Kentucky 1935
*Schorger, A[rlie] W[illiam], 168 N. Prospect Ave., Madison, Wisconsin ..1927
**Schramm, Wilson Cresap, 321 Kensington Rd., Syracuse, New York 1944
Schreck, J. D., 289th Repl. Co., 3rd Plat., A.P.O. 781 R, % P.M., New York City 1945
*Schuette, Chal H., Detachment of Patients, England General Hospital, Atlantic City, New Jersey 1942
Schumm, William George, 302 C. St., LaPorte, Indiana 1944
*Schwall, Eugene E[dward], New Concord, Ohio 1943
*Schwartz, Charles Walsh, Route 6, Columbia, Missouri 1943
Scotland, Minnie B[rink], 42 Continental Ave., Cohoes, New York 1938
*Scott, John William, 1409 Garfield St., Laramie, Wyoming 1937
Scott, Thomas G[eorge], Zoology Department, Science Bldg., Ames, Iowa.1936
Scott, W[alter] E[dwin], Mendota Beach Heights, Madison 5, Wisconsin.1938
Seaberg, John A[rthur], Veterans Administration, Minneapolis 6, Minnesota 1944
Seeber, E[dward] L[incoln], 186 Wabash Ave., Kenmore 17, New York.1944
Seeley, George Mervil, 461 High St., Long Branch, New Jersey 1945
Seibert, Henri C., 2102 E. 98th St., Chicago 17, Illinois 1941
*Sener, Miss Ruth, 233 Charlotte St., Lancaster, Pennsylvania 1943
Serbousek, Miss Lillian, 1226 Second St., S.W., Cedar Rapids, Iowa 1935
*Shaffer, Chester M[onroe], 809 S. 4th St., Chickasha, Oklahoma 1934
Shaftesbury, Archie D., Women's College, University of North Carolina, Greensboro, North Carolina 1930
Sharp, Ward M., Red Rock Lakes Refuge, Monida, Montana 1936
Shaughnessy, Mrs. Martin, One Washington Terrace, St. Louis, Missouri..1944
Shaver, Jesse M[ilton], George Peabody Teachers College, Nashville, Tennessee 1922
Shaw, Dr. Charles H[icks], Bremen, Ohio 1941
Shaw, Mrs. Elizabeth Martin, 2312 Stuart Ave., Richmond 20, Virginia..1943
**Shearer, A[mon] R[obert], Mont Belvieu, Chambers Co., Texas 1893
*Shelar, Keller, State Teachers College, Slippery Rock, Pennsylvania 1940
*Shelford, Victor E[rnest], Vivarium Bldg., University of Illinois, Champaign, Illinois 1931

Sheppard, Roy Watson, 1805 Mouland Ave., Niagara Falls, Ontario, Canada 1933
Sherwood, John Willitts, 34 Hebbron St., Salinas, California 1936
Shields, Louise (Mrs. Alston B.), 511 B Nancy St., Charleston, West Virginia 1945
Short, Wayne, 1006 Fifth Ave., New York 28, New York 1941
Shortt, Terence Michael, Royal Ontario Museum of Zoology, Queen's Park at Bloor St., Toronto, Ontario, Canada 1941
Shubeck, Paul P[eter], 440 Bond Street, Elizabeth 1, New Jersey 1943
*Shultis, Newton, South Newberry, New Hampshire 1945
Sibley, Charles G., 1438 Hawthorne Terrace, Berkeley, California 1942
Sibley, Norman Othello, Route 2, Whittemore, Michigan 1945
Simmons, Mrs. Amelia C., 2007 N. Holton St., Milwaukee 12, Wisconsin.1943
***Simmons, Edward McIlhenny, Avery Island, Louisiana 1942
*Simon, Miss Tina, Wave Barracks 402, Naval Air Station, Patuxent River, Maryland 1945
Sims, Harold L[ee], 714 St. Philip St., Thibodaux, Louisiana 1942
Skaggs, Merit Bryan, 2066 Alton Road, East Cleveland 12, Ohio 1934
Skutch, Alexander F., San Isidro del General, Costa Rica 1944
Slack, Miss Mabel, 1004 Everett Ave., Louisville, Kentucky 1934
*Smith, A[rthur] F[rancis], Manning, Iowa 1934
*Smith, Bertram H., 512 Harries Bldg., Dayton, Ohio 1944
*Smith, Frank R[ush], Route 2, Box 100, Laurel, Maryland 1910
Smith, George A., Quarryville High School, Quarryville, Pennsylvania 1945
*Smith, Harry M[adison], 2007 Calumet Ave., Whiting, Indiana 1936
Smith, J. Donald, 1359 Sargent Ave., St. Paul 5, Minnesota 1939
*Smith, Lewis McCuen, 8040 St. Martins Lane, Chestnut Hill Station, Philadelphia, Pennsylvania 1931
Smith, Luther E[ly], 1554 Telephone Bldg., 1110 Pine St., St. Louis, Missouri 1941
*Smith, Oliver L[edlie], 15 York Ave., Towanda, Pennsylvania 1944
Smith, Orion O., 1539 Crosby St., Rockford, Illinois 1936
Smith, Robert Leo, Route 1, Reynoldsville, Pennsylvania 1945
*Smith, Roy Harmon, 183 N. Prospect St., Kent, Ohio 1936
Smith, Thomas [Price], Osage Ave., Anchorage, Kentucky 1941
Smith, Wendell Phillips, Wells River, Vermont 1921
Snapp, Mrs. R. R., 310 W. Michigan, Urbana, Illinois 1940
Snyder, L[ester] L[ynne], Royal Ontario Museum of Zoology, Queen's Park at Bloor, Toronto 5, Ontario, Canada 1929
Snyder, Richard Craine, 431 Clark St., South Orange, New Jersey 1940
Sooter, Clarence Andrew, 402 Hester St., Stillwater, Oklahoma 1940
Soper, J[oseph] Dewey, 827 Riverwood Ave., Fort Garry, Winnipeg, Manitoba, Canada 1937
Spangler, Miss Iva M., 128 E. Foster Parkway, Fort Wayne, Indiana ...1939
Spawn, Gerald B., 1101 2nd St., Brookings, South Dakota 1941
*Speirs, Mrs. Doris Huestis, 17 Wolfrey Ave., Toronto, Ontario, Canada..1936
Speirs, J[ohn] Murray, 17 Wolfrey Ave., Toronto, Ontario, Canada 1931
*Spencer, Miss O[live] Ruth, 1030-25 Avenue Court, Moline, Illinois 1938
Sperry, Charles Carlisle, 1455 S. Franklin St., Denver 10, Colorado 1931
Spofford, Walter R. II, Vanderbilt University Medical School, Nashville, Tennessee 1942
Stabler, Robert M[iller], Glen Mills, Pennsylvania 1939
Staebler, Lt. Arthur E[ugene], U.S. Public Health Service, Miami Beach 39, Florida 1937
**Stahl, Miss Majoretta Jean, Kimberly, West Virginia 1942
Stanford, Jack A[rchibald], 553 S. First St., Ann Arbor, Michigan 1941
Stark, Miss Wilma R[uth], 1701 16th, N.W., Washington, D.C. 1939

Starrett, William C[harles], % W. C. Starrett, 105 Glen Oak Court, Peoria, Illinois 1933
Stearns, Edwin I. Jr., 92 Farragut Rd., Plainfield, New Jersey 1945
*Stebbins, Miss Fannie A[dell], 31 Ely Ave., West Springfield, Massachusetts 1935
*Steffen, Earnest William, 1000 Maplewood Drive, Cedar Rapids, Iowa ..1944
Steggerda, Morris, Kennedy School of Missions, Hartford 5, Connecticut.1941
Stegle, Joseph James, 220 Pondfield Rd., W., Bronxville, New York 1944
Stephens, T[homas] C[alderwood], Morningside College, Sioux City, Iowa 1911
*Stevens, O. A., State College Station, Fargo, North Dakota 1926
Stevenson, Henry M[illis] Jr., Emory and Henry College, Emory, Virginia 1943
Stevenson, Lt. H[orace] Godwin Jr., Address unknown 1939
Stevenson, James O[sborne], 118 N. Birmingham Place, Tulsa 4, Oklahoma 1943
*Stewart, Paul A[lva], Leetonia, Ohio 1925
Stewart, Robert Earl, Patuxent Research Refuge, Bowie, Maryland 1939
*Stickney, Mrs. Albert Jr., % H. E. Herrick, Woodmere, Long Island, New York 1935
*Stillwell, Jerry E., 8160 San Benito Way, Dallas 18, Texas 1935
**Stine, Miss Perna M., Route 4, Sumner, Illinois 1931
***Stoddard, Herbert Lee, Sherwood Plantation, Route 5, Thomasville, Georgia 1916
Stokes, Allen W., 629 Church Lane, Philadelphia 44, Pennsylvania 1945
Stone, Harry H[erbert] Jr., Box 101, Sturbridge, Massachusetts 1941
Stoner, Mrs. Dayton, New York State Museum, Albany, New York 1945
Stophlet, John J[ermain], 2612 Maplewood Ave., Toledo, Ohio 1934
Storer, Robert Winthrop, Museum of Vertebrate Zoology, Berkeley, California 1938
Storer, Tracy I[rwin], Division of Zoology, University of California, Davis, California 1928
Stratton, Miss Nellie Mary, 209 Cutler St., Allegan, Michigan 1945
Street, Thomas M., Bottineau, North Dakota 1940
***Strehlow, Elmer William, 721 W. Mason St., Green Bay, Wisconsin 1941
Stringham, Emerson, Box 1085, Prescott, Arizona 1940
Stromgren, Carl, General Delivery, Iowa City, Iowa 1944
****Strong, R[euben] M[yron], 5840 Stony Island Ave., Chicago, Illinois.Founder
Struck, Kuno H[erbert], 1003 First National Bank Bldg., Davenport, Iowa 1942
Strunk, William Franklin, 700 Madison Ave., Morgantown, West Virginia.1944
Stupka, Arthur, Great Smoky Mountains National Park, Gatlinburg, Tennessee 1935
***Sturgeon, Myron T., Michigan State Normal College, Ypsilanti, Michigan.1934
Sturgis, S[ullivan] Warren, 66 Marlboro St., Boston, Massachusetts ...1941
*Sturm, [William] Louis, Sheffield Road, Glendale, Ohio 1943
*Suthard, James G[regory], 1881 Raymond Ave., Longbeach 6, California.1936
***Sutton, George Miksch, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1920
*Swanson, Gustav [Adolph], 5245 N. Sawyer, Chicago 25, Illinois 1927
*Swedenborg, Ernie D[avid], 4905 Vincent Ave. S., Minneapolis 10, Minnesota 1929
Swoger, Arthur [Glenn], 1655 Shady Ave., Pittsburgh 17, Pennsylvania..1943
*Taber, Wendell, 3 Mercer Circle, Cambridge, Massachusetts 1936
Tabor, Miss Ava Rogers, 305 Canal Blvd., Thibodaux, Louisiana 1940

*Taintor, Mrs. Elizabeth Taber, 11 Story Street, Cambridge, Massachusetts 1945
Tallman, Wm. S[weet] Jr., 4 Linden Place, Sewickley, Pennsylvania ...1940
*Tanger, Mrs. C. Y., 318 N. President Ave., Lancaster, Pennsylvania 1943
Tanghe, Leo J[oseph], 120 Barnard St., Rochester, New York 1943
Tanner, James Taylor, 16½ No. Church St., Cortland, New York 1937
Tatum, Miss Bernice, 1105 Lowell, Kansas City 2, Kansas 1943
*Taverner, P[ercy] A[lgernon], 45 Leonard Ave., Ottawa, Ontario, Canada 1905
*Taylor, Aravilla M[eek], Lake Erie College, Painesville, Ohio 1936
***Taylor, Arthur Chandler, Irving Zuelke Bldg., Appleton, Wisconsin 1929
***Taylor, Mrs. H. J., 900 Santa Barbara Road, Berkeley, California 1916
Taylor, Miss Joanne, 1176 Shattuck, Berkeley, California 1941
*Taylor, Walter P[enn], 254 Faculty Exchange, College Station, Texas ..1937
Taylor, William Ralph, Museum of Vertebrate Paleontology, University of Kansas, Lawrence, Kansas 1940
*Teachenor, Dix, 1020 West 61st St., Kansas City, Missouri 1923
*Templeman, Wilfred, Government Laboratory, Water St., East, St. John's, Newfoundland 1943
Thacher, S. Charles, 2918 Brownsboro Road, Louisville 6, Kentucky ..1942
*Thomas, Edward S[inclair], 319 Acton Rd., Columbus, Ohio 1921
*Thomas, Mrs. Rowland, R.F.D. 3, North Little Rock, Arkansas 1937
Thompson, Daniel Q., USS Joseph T. Dickman, APA 13, % F.P.O., San Francisco, California 1945
Thomsen, Mrs. H. P., % Louis Larsen, Route 3, Box 406, Beloit, Wisconsin 1945
*Thornton, William James, Box 1011, Birmingham, Alabama 1940
***Thorp, George B[oulton], Carnegie Museum, Pittsburgh 13, Pennsylvania 1935
Thorpe, James David, 9 Elmdale Ave., Akron, Ohio 1945
*Tift, Richard, The Oaks, Newton, Route 1, Albany, Georgia 1937
*Tilley, Francis Thomas, 26 Mohican Ave., Buffalo 8, New York 1944
*Tinker, A[lmerin] D[avid], R.F.D. 1, Chelsea, Michigan 1909
*Tipton, Dr. Samuel R[idley], 828 South 20th St., Birmingham 5, Alabama 1941
Todd, Mrs. Elizabeth D., 918 West Main St., Kalamazoo, Michigan 1939
Todd, George K[endall], USS LST 663, % Fleet Post Office, San Francisco, California 1943
Todd, Henry O[liver] Jr., Woodberry Road, Murfreesboro, Tennessee ...1938
Todd, Mabel Sellars (Mrs. A. P.), 1622 Kensington St., Houston 6, Texas 1940
**Todd, W[alter] E[dmond] Clyde, Carnegie Museum, Pittsburgh 13, Pennsylvania 1911
*Tomkins, Ivan Rexford, 1231 E. 50th St., Savannah, Georgia 1931
*Towle, Miss Helen Jessie, 5148 29 Ave. S., Minneapolis 6, Minnesota 1944
**Townsend, Miss Elsie White, Wayne University, Detroit 1, Mich. 1938
***Trautman, Milton B[ernhard], Stone Laboratory, Put-in-Bay, Ohio 1932
Trimm, Wayne, 165 Strong Ave., Syracuse, New York 1943
Tryon, C[larence] A[rcher] Jr., Zoology Department, Montana State College, Bozeman, Montana 1942
*Tubbs, Farley F., Game Division, Department of Conservation, Lansing 13, Michigan 1935
***Tucker, Mrs. Carll, Penwood, Mount Kisco, New York 1928
Tucker, Edward Robert, 245 N. Auburndale, Memphis, Tennessee 1942
*Turner, Miss Ruth D[ixon], Museum of Comparative Zoology, Cambridge 38, Massachusetts 1939
Tuttle, George Mott Jr., 4016 Cliff St., Niagara Falls, New York 1941

Tvedt, Lt. Harold B[loom], 4206 71st Ave., Landover Hills, Hyattsville, Maryland 1941
*Twomey, Arthur C[ornelius], Carnegie Museum, Pittsburgh 13, Pennsylvania 1936
*Tyler, Dr. Winsor M[arrett], 1482 Commonwealth Ave., Brighton 35, Massachusetts 1914
*Uhler, Francis Morey, Patuxent Research Refuge, Bowie, Maryland 1931
**Uhrig, Mrs. A. B., Box 28, Oconomowoc, Wisconsin 1926
Umbach, Miss Margaret, 2526 East Drive, Fort Wayne 3, Indiana 1941
*Upton, Clyde B., 120 Center Ave., Elm Grove, West Virginia 1945
*Vaiden, M[eredith] G[ordon], Rosedale, Mississippi 1937
Van Camp, Laurel F[rederick], Genoa, Ohio 1943
Van Coevering, Jack, 9816 Ingram, Rosedale Gardens, Plymouth, Michigan 1939
Vandervoort, Millard, 909 Security Bank Bldg., Battle Creek, Michigan..1945
Vandervort, Charles C[hampion], Laceyville, Pennsylvania 1937
Van Laar, Henry, U.S. Naval Hospital Staff, Great Lakes, Illinois 1944
*van Rossem, A[driaan] J[oseph], 2205 West Adams St., Los Angeles 7, California 1939
Van Strum, Miss Caroline, 3122 15th Ave., S., Minneapolis 7, Minnesota.1944
**Van Tyne, Mrs. Claude H., 1003 Spruce St., Boulder, Colorado 1939
***Van Tyne, Josselyn, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1922
*Vaughan, William C[oleman], 591 Ashland Ave., Buffalo, New York ...1938
Vickers, Ernest Waters, Old Mill Museum, Youngstown, Ohio 1944
*Visscher, Paul, Biology Laboratory, Western Reserve University, Cleveland, Ohio 1924
*Voak, Mrs. Floyd S., 909 S. Custer Ave., Miles City, Montana 1945
*Vogt, William, % Mrs. F. V. Brown, 32 Cunningham Ave., Floral Park, New York 1935
*Vollmar, Mrs. Joseph E., 6138 Simpson Ave., St. Louis, Missouri 1941
*Wade, Douglas E., Natural History Bldg., Dartmouth College, Hanover, New Hampshire 1936
*Waggoner, John Sheaffer, 239 Storer Ave., Akron, Ohio 1945
Wagner, Esther E., 13 Locust Ave., Danbury, Connecticut 1937
Wagner, Helmuth O., Apartado 7901, Sucursal 3, Mexico, D. F., Mexico..1945
Wagner, Julia E. (Mrs. H. J.), 818 E. Boulder St., Colorado Springs, Colorado 1945
**Walcott, Hon. Frederick C., Investment Bldg., Washington, D.C. 1945
*Walker, Charles F[rederic], Stone Laboratory, Put-in-Bay, Ohio 1939
Walker, M[yrl] V[incent], Yosemite National Park, California 1943
*Walker, William M. Jr., 107 N. Park Circle, Nashville 5, Tennessee 1945
***Walkinshaw, Lawrence Harvey, 1703 Central Tower, Battle Creek, Michigan 1928
*Wallace, Miss Edith Adell, 421 West 8th Ave., Gary, Indiana 1945
Wallace, George J[ohn], Zoology Department, Michigan State College, East Lansing, Michigan 1937
Wallner, Dr. Alfred, 807 Juniper St., Washington 12, D.C. 1941
Walters, Miss Kathleen, 312 Crane, Royal Oak, Michigan 1944
Wampole, John Henry, Broken Bow, Nebraska 1944
Wandell, Willet N[orbert], Natural History Survey, Urbana, Illinois ..1944
Wangnild, Miss Lillian M[arie], 2818 Gaylord St., Denver 5, Colorado ..1943
Wanless, Harold R[ollin], 704 S. McCullough St., Urbana, Illinois 1940
*Watson, Clarence W., Box 833, Atlanta, Georgia 1943
Watson, Frank Graham, 5423 Leopold St., Houston 4, Texas 1937
Watson, James Dewey Jr., 7922 Luella Ave., Chicago, Illinois 1945

Watson, Robert J[ames], Box 75, Blacksburg, Virginia 1943
*Weaver, Richard L[ee], Audubon Nature Center, R.F.D. 4, Greenwich, Connecticut 1936
Weber, Edmund P[eter], 95 Ingram Ave., Pgh. 5, Ingram, Pennsylvania..1942
*Weber, Orlando F[ranklin] Jr., 910 Fifth Ave., New York City 21 1936
Webster, Lt. J[ackson] Dan, % J. L. Webster, 1803 Franklin St., San Francisco 9, California 1939
Webster, Victor S[tuart], College Station, Brookings, South Dakota 1944
Welch, Mrs. Lola Harriet, 610 Bowen St., Savanna, Illinois 1943
Welles, Mary Pyke (Mrs. George M.), Camden, Delaware 1938
**Wernicke, Maleta M. (Mrs. J. F.), Gull Point, Escambia Co., Florida ...1944
Weston, Robert, Salmon Pool Farm, Brewer, Maine 1944
*Wetmore, Alexander, U.S. National Museum, Washington 25, D.C. 1903
*Weydemeyer, Winton, Fortine, Montana 1930
*Weyl, Edward Stern, 6909 Henley St., Philadelphia 19, Pennsylvania 1927
**Wheatland, Miss Sarah B[igelow], 313-15 Raywood House, Vassar College, Poughkeepsie, New York 1942
White, Claude, 940 West 6th St., P.O. Box 1001, Plainfield, New Jersey..1944
White, Courtland Y., Box 31, Bennett Hall, University of Pennsylvania, Philadelphia, Pennsylvania 1942
*White, Francis Beach, Silk Farm Road, Route 2, Concord, New Hampshire 1926
*White, Miss Katherine A[ugusta], Route 2, Collinsville, Illinois 1940
White, Miss Marcia R., 5626 Dorchester Ave., Chicago 37, Illinois 1944
*Whitney, Nathaniel Ruggles Jr., 975 Willow Ave., Glendale, Ohio 1942
*Whittier, Mrs. Lida, 2830 E. 130th St., Cleveland 20, Ohio 1943
Widdicombe, Harry T., 439 Fulton St., S.E., Grand Rapids 3, Michigan ..1943
Widmann, Berthold, 4621 Wesley Ave., Los Angeles 37, California 1936
*Wiggin, Henry T[aylor], 151 Tappan St., Brookline, Massachusetts 1941
Wilcox, Harry Hammond Jr., 1236 Isabella St., Williamsport 33, Pennsylvania 1938
Wilcox, LeRoy, Speonk, Long Island, New York 1944
Wiles, Harold O[liver], 26 Boxwood Ave., Wilmington 177, Delaware ..1936
Wilkowski, William [Walter], 119 Bronson Court, Kalamazoo 12, Michigan 1943
Williams, George G., The Rice Institute, Houston, Texas 1945
*Williams, Laidlaw O[nderdonk], Route 1, Box 138, Carmel, California..1930
*Wilson, Archie F[rancis], 1322 Braeburn Rd., Flossmoor, Illinois 1937
*Wilson, Gordon, 1434 Chestnut St., Bowling Green, Kentucky 1920
Wilson, Harold Charles, Ephraim, Wisconsin 1938
Wilson, Myrtha M. (Mrs. Henry E.), Route 3, Box 118, Raleigh, North Carolina 1942
Wilson, Lt. Comdr. Rowland S[teele], % Otto Heaton, Apt. 1854, Deshler-Wallick Hotel, Columbus, Ohio 1941
Wilson, Ruth (Mrs. Carl), 11285 Lakepointe, Detroit 24, Michigan 1941
Wiltshire, Mrs. Grace T., Randolph-Macon Woman's College, Lynchburg, Virginia 1941
***Wineman, Andrew, 150 Michigan Ave., Detroit, Michigan 1934
***Wing, Harold F[rancis], Route 3, Jackson, Michigan 1941
*Wing, Leonard [William], Washington State College, Pullman, Washington 1924
Winterbottom, J[ohn] M[iall], African Education Office, P.O. Box 150, Livingstone, Northern Rhodesia 1939
Wistey, Mrs. A. L., South English, Iowa 1944

Wolfson, Albert, Department of Zoology, Northwestern University, Evanston, Illinois 1944
*Wood, Dr. Harold B[acon], 3016 N. Second St., Harrisburg, Pennsylvania.1932
*Wood, Merril, 811 N. Allen St., State College, Pennsylvania 1945
Woodard, Frederick A., 54 Emmett St., Battle Creek, Michigan 1945
Woodward, Arthur J[ason], 504 Kahkwa Blvd., Erie, Pennsylvania 1937
**Woodward, Miss Barbara, 24 West Main St., Le Roy, New York 1943
*Worley, John G[raves], 237 Charleston St., Cadiz, Ohio 1936
Wright, Miss Audrey Adele, 1312 Hepburn, Louisville, Kentucky 1941
Wright, Lt. Col. Dana [Monroe], State Game Farm, St. John, North Dakota 1943
Wright, Ernest B[icknell], 140 West Chestnut Ave., Chestnut Hill, Philadelphia, Pennsylvania 1941
*Wright, J[ohn] T[homas], Route 5, Box 618, Tucson, Arizona 1941
Wright, Philip L[incoln], Montana State University, Missoula, Montana.1940
Wright, Thomas Jr., 19 Mechanic St., Wakefield, Rhode Island 1939
*Yeager, Lee E[mmett], Fish and Wildlife Service, Merchandise Mart, Chicago 54, Illinois 1939
*Yeatter, R[alph] E[merson], Illinois Natural History Survey, Urbana, Illinois 1932
Young, J. Addison II, 93 Argyle Ave., New Rochelle, New York 1942
**Young, James B[oswell], 514 Dover Rd., Louisville 6, Kentucky 1937
Zempel, Capt. Arnold, 6623 Kingsbury Ave., University City 5, Missouri..1941
*Zimmerman, Dale, 480 North Almont St., Imlay City, Michigan 1943
Zimmerman, Mrs. Janet H., 1211 Michigan Ave., Evanston, Illinois 1945
*Zirrer, Francis, 2241 North 21st St., Milwaukee 5, Wisconsin 1943

INDEX TO VOLUME 57, 1945

In addition to names of species and of authors, this index includes references to the following topics: bibliography, conservation, display, distribution, diving, food, hybridization, localities by states and countries, longevity, melanism, migration, molt, nesting, new forms noticed, population, predation, roosting, taxonomy, territory, voice, weight.

Aechmophorus occidentalis, 76
Aethia, 25 (footnote)
Agelaius phoeniceus, 198
Aix, 6, 30
  galericulata, 26, 27, 30, 32, 48, 129
  sponsa, 26, 27, 30, 32, 129, 131
Aldrich, John W. Birds of a Deciduous Forest Aquatic Succession (Part 2 of Symposium), 243–245
Alopochen aegyptiacus, 5, 6, 12, 14, 51
Amazonetta brasiliensis, 27, 30, 51
  vittata, 27 (footnote)
Anas, 6, 16–18, 50, 51, 52
  acuta, 13, 19, 51
  albogularis, see A. gibberifrons
  americana, 21–22
  andium, see A. flavirostris
  angustirostris, 19, 23
  aucklandica, 20, 50, 52
  bahamensis, 19, 51
  bernieri, 20
  brasiliensis, see Amazonetta brasiliensis
  capensis, 19
  castanea, 20
  chlorotis, see A. aucklandica
  clypeata, 22
  couesi, see A. strepera
  crecca, 19
  cyanoptera, 17, 22-23
  diazi, see A. fulvigula
  discors, 17, 22, 131
  eatoni, see A. acuta
  erythrorhyncha, 19
  falcata, 20
  flavirostris, 19, 21
  formosa, 20, 79, frontispiece
  fulvigula, 21
  f. maculosa, 266
  galapagensis, see A. bahamensis
  georgica, 19, 21, 51
  gibberifrons, 20
  laysanensis, see A. platyrhynchos
  leucophrys, 23, 46 (fig. 18), 48, 51, 54
  luzonica, see A. poecilorhyncha
  melleri, 21
  oustaleti, see A. platyrhynchos
  penelope, 21-22, 51
  platalea, 17, 22
  platyrhynchos, 17, 19, 21, 27, 51, 52 131
  poecilorhyncha, 21
  punctata, 19
  querquedula, 17, 22
  rhynchotis 17, 22
  rubripes, 131; see also A. fulvigula
  sibilatrix, 16, 21–22, 51
  smithi, 22, 52
  sparsa, 16, 21
  specularioides, see Lophonetta specularioides
  specularis, 13, 18
  spinicauda, see A. georgica
  strepera, 20, 21, 22, 39, 51
  superciliosa, see A. poecilorhyncha
  undulata, 19, 21
  versicolor, 19, 23, 43
  waigiuensis, 18, 46 (fig. 17), 48, 52, 53
  wyvilliana, see A. platyrhynchos
Anatidae, 3–55
Anatinae, 7, 11–36, 43, 44
Anatini, 7, 15, 16–24, 43, 44, 48, 49, 50
Anhimae, 7
Anser, 6, 9, 10, 50, 51, 52
  albifrons, 9, 202
  anser, 51
  brachyrhynchus, see A. fabalis
  cygnoides, 51
  erythropus, 9
  fabalis, 9
  neglectus, see A. fabalis
Anseranas semipalmata, 5, 27, 28, 42, 43, 50, pl. 6
Anserinae, 7, 8–11, 44
Anserini, 7, 8–10, 43, 44, 45, 49, 50
Antbird, Spotted, 123
Antcatcher, Bicolored, 123
Antpitta, 123, 126
Ant-thrush, 122–128
Antrostomus carolinensis, 107
Antwren, 123
Archilochus colubris, 203
Arctonetta, 6; see also Somateria fischeri
Ardea herodias, 131
Arkansas, 61
Asarcornis, see Cairina scutulata
Attila rufus, 189
Australia, 51
Automolus leucophthalmus, 189
Aythya, 6, 25 (footnote), 26, 52; see also Nyroca
  affinis, 25, 26
  americana, 26
  australis, 26
  baeri, 26
  collaris, 26
  ferina, 26

fuligula, 25, 26, 48
innotata, 26, 53
marila, 25, 26
novae-seelandiae, 26
nyroca, 26
valisineria, 25, 26
Aythyini, 7, 24–26, 43, 44, 48, 49, 50

Baker, Bernard, pl. 11
Barbour, Thomas. "A Naturalist in Cuba" (reviewed), 265; review by, 137
Barro Colorado Island, 122, 123
Basileuterus fulvicauda, 222, 227, 230, 232
Batara cinerea, 189
Baumgartner, Frederick M. New records for northcentral Oklahoma, 76–77
Baumgras, Philip. Crow killed by a Red-tailed Hawk, 129
Bibliography, 82–85, 138–142, 211–214, 267–271
Biziura lobata, 36
Blackbird, Brewer's, 247, 266
European, 58, 63, 67, 68, 70
Bobolink, 105, 247
Bob-white, 131, 193
Bonasa umbellus, 131
Bond, James. "Check-list of Birds of the West Indies" (reviewed), 137–138
Brackbill, Hervey. Robin using abandoned Cardinal nest, 261
Brant, 37
Branta, 9, 10, 50, 51, 52
bernicla, 37
canadensis, 131, pl. 2
leucopsis, 37
ruficollis, 37
sandwicensis, 9, pl. 2
Brazil, 26 (footnote), 188–190
Brooks, Maurice Graham, biog. sketch of, 135
Bubo virginianus, 131
Bucephala albeola, 32, 54
clangula, 34
islandica, 34
Buffle-head, 32, 54
Bunting, Indigo, 92, 107
Lark, 77, 247
Painted, 107
Buteo jamaicensis, 129, 131
lineatus, 131
Butorides virescens, 96

Cairina, 48, 49, 51
hartlaubi, 29
moschata, 27, 29, 47 (fig. 20)
scutulata, 29
Cairinini, 7, 11, 26–31, 44, 45, 48, 49, 50, 51
Calamospiza melanocorys, 77
California, 202
Calonetta, 23
Campeche, 92, 112–116
Campephilus principalis, 131
Camptorhynchus labradorius, 32, 33
Canada, 247, 248
Canvas-back, 25, 26
Capella gallinago delicata, 75, 76, 89
g. gallinago, 76
Cardinal, 193, 261
Care of young, 8, 10, 15, 22, 35, 44, 49, 147, 149, 151–152, 153, 157, 160–161, 162, 163, 178–182
Carpodacus purpureus, 67
Casarca, 5, 11; see also Tadorna
Castle-builders, 127
Catbird, 244
Cathartes aura, 203
Ceophloeus pileatus, 131
Cereopsis novae-hollandiae, 5, 11, 12, 13, 42, 43, 48, 50, pl. 4
Certhiaxis cinnamomea, 189
Chamberlain, Frank Wilbut. "Atlas of Avian Anatomy: Osteology, Arthrology, Myology" (reviewed), 138
Chapman, Frank M. Obituary, 264
Charadriiformes, 64
Charadrius hiaticula, 64
Chat, Yellow-breasted, 92, 107
Chateau de Clères, 3
Chaulelasmus, 17; see also Anas strepera
Chen, 6, 9, 131
atlantica, 37
caerulescens, 37
hyperborea, 37, 202
rossi, 37
Cheniscus, 40
Chenonetta jubata, 5, 27, 30–31, 42, 47 (fig. 19), 48, 129
Chenopis, see Cygnus atratus
Chickadee, Black-capped, 244
Chicken, Greater Prairie, 90–91, 133 (fig.)
Prairie, 131, 195
Chlidonias nigra, 204
Chloëphaga, 5, 6, 11, 12–14, 15, 27, 50
dispar, see C. picta
hybrida, 13
leucoptera, see C. picta
melanoptera, 13
picta, 13, 48, pl. 5
poliocephala, 13, pl. 5
rubidiceps, 13
Chondestes grammacus grammacus, 131
Chordeiles acutipennis, 109
minor, 107, 204
Chuck-will's-widow, 107
Cichlocolaptes leucophrys, 189
Circus cyaneus hudsonius, 131
Clangula hyemalis, 32, 34, 48

Coccyzus americanus, 107
erythrophthalmus, 101, 104
Colaptes auratus, 131
Colibri cyanotus, 165
thalassinus, 165–187
Colinus virginianus, 131, 193
Colorado, 261
Compsothlypis americana, 97, 98, 107
Conservation, 78, 136
Corvus brachyrhynchos, 129, 131
Corvus corax, 131
c. principalis, 266
c. sinuatus, 266
Coscoroba coscoroba, 6, 10, 11, 43, 45, pl. 3
Costa Rica, 123, 217, 223–240
Cowbird, Shiny, 189, 190
Crane, Little Brown, 131
Sandhill, 131, 247
Whooping, 134–135
Crow, 129, 131
Crypturellus obsoletus, 189, 190
Cuckoo, Black-billed, 101, 104
Yellow-billed, 107
Cyanochen cyanopterus, 11, 12, 14, 50
Cyanocitta cristata, 70
Cygnopsis, 9
Cygnus, 6
atratus, 8, 10, 49
bewicki, see C. columbianus
buccinator, 131; see also C. cygnus
columbianus, 8
cygnus, 8,
melanocoryphus, 8, 9
olor, 8, 9, 10

Dafila, 6
Dambach, Charles A. Wildlife Conservation, 78, 136
Davis, David E. The Occurrence of the Incubation-Patch in Some Brazilian Birds, 188-190
Delacour, Jean. The display of the Maned Goose, 129; biog. sketch of, 88
Delacour, Jean, and Ernst Mayr. The Family Anatidae, 3–55
Dendrocygna, 6, 9, 10–11, 49
arborea, 11
arcuata, 11
autumnalis, 11, 45
bicolor, 10, 11, 45, 52
eytoni, 11, 45, 46 (fig. 15), pl. 4
guttata, 11, 45, 46 (fig. 14)
javanica, 11
viduata, 10, 11, 52, pl. 3
Dendrocygnini, 7, 10–11, 43, 44, 45, 49, 50
Dendroica aestiva, 96, 101, 102, 196, 198
caerulescens, 104, 149–152, 162
castanea, 101, 105, 108
cerulea, 96, 98
discolor, 107, pl. 11
dominica, 97, 98, 107
d. albilora, 130
fusca, 98, 101, 105, 146 (fig. 1), 153–154, 162
magnolia, 101, 104, 146, 147 (fig. 2), 148, 162
pensylvanica, 101, 105, 150, 154–157, 162
potomac, 130
striata, 101, 102, 105
tigrina, 101, 104, 132
virens, 101, 105, 147 (fig. 2), 152–153, 154, 162
Dendronessa, 6; see also Aix galericulata
Dickcissel, 108, 130
Display, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17–18, 19, 20, 21, 22, 23, 24, 25, 26, 28–29, 30, 31, 33, 34–35, 44, 49–50, 129, 148–149, 150, 158, 160, 170, 171–172, 222, 233–234, 239
Distribution, 51-53, 191–201, 243–252
Diving, 9, 11, 12, 16, 32, 44, 50
Dolichonyx oryzivorus, 105
Dove, Mourning, 193, 198
Dowitcher, 89, 133, pl. 8
Drymophila ferruginea, 189
milura, 189
Dryobates villosus, 159
Duck,
African Black, 16, 21
African Red-billed, 19
African Yellow-billed, 19, 21
African White-backed, 36
Argentine Ruddy, 35
Australian, 21, 39
Australian Musk, 36,
Australian White-eyed, 26
Baer's White-eyed, 26
Bahama, 19, 51
Black, 21, 39, 131
Black-billed Whistling, 11, 37
Black-headed, 36, 54
Blue, 23, 54
Blue-billed, 35
Bronze-winged, 13, 18
Comb, 28-29, 43, 48, 49, pl. 7
Common White-eyed, 26
Crested, 11, 12, 13, 15, 18, 54
Dusky, 21
Freckled, 6, 24, 42, 43, 54
Fulvous Whistling, 10, 11, 45, 52
Galápagos Island, 19, 38
Harlequin, 32, 34, 48
Hartlaub's, 29
Hawaiian, 21, 39, 52
Indian Whistling, 11, 37
Labrador, 32, 33
Maccoa, 41
Madagascan White-eyed, 26, 53
Mandarin, 26, 27, 30, 32, 48, 129
Masked, 35
Meller's, 21

Mexican, 21, 39
Mottled, 266
Muscovy, 27, 29, 47 (fig. 20)
New Zealand, 26
North American Ruddy, 35
Peruvian Ruddy, 35, 41
Philippine, 21, 39
Pink-eared, 6, 23, 50, 54
Pink-headed, 23, 52, 54
Plumed Whistling, 11, 45, 46 (fig. 15), pl. 4
Red-billed Whistling, 11, 37, 45
Ring-necked, 26, 131
Salvadori's, 18, 46 (fig. 17), 48, 52, 53
Southern Stiff-tailed, 47 (fig. 22)
Spotted Whistling, 11, 45, 46 (fig. 14)
Steamer, 6, 11, 15, 38
Torrent, 23, 36, 45, 47 (fig. 23), 48–49, 50, 54
Tufted, 25, 26, 48
Wandering Whistling, 11, 37
White-faced Whistling, 10, 11, 52, pl. 3
White-headed, 35
White-winged, 29
Wood, 26, 27, 30, 32, 129, 131

Eagle, Bald, 131
Ectopistes migratorius, 131
Eider, 6, 43, 48
Common, 33
King, 33
Spectacled, 33, 52
Steller's 33
Elaenia mesoleuca, 189
Empidonax euleri, 189, 190
flaviventris, 104
minimus, 101
traillii, 101
virescens, 96, 107
Ereunetes pusillus, 203
Ergaticus versicolor, 222, 230
Erithacus rubecula melophilus, 63, 67, 70
Erolia minutilla, 203
Eulabeia, 9, 37
Eupetomena macroura, 189, 190
Euphagus cyanocephalus, 266

Falco sparverius, 203
Farner, Donald S. Age Groups and Longevity in the American Robin, 56–74, 142 (footnote)
Figgins, Jesse Dade. "Birds of Kentucky" (reviewed), 265–267
Finch, Purple, 67, 247
Flicker, 131
Florida, 97, 103, 104–105, 109, 118
Flycatcher, Acadian, 96, 107
Alder, 101, 244
Crested, 127, 195
Least, 101
Olive-sided, 247
Yellow-bellied, 104
Food, 8, 11, 12, 25, 32, 35, 44, 50, 77, 123, 132, 179–181, 196, 202, 204, 218, 224–225, 234–235, 262
Formicarius analis, 122–128

Gadwall, 20, 21, 22, 39, 51
Gavia immer, 131
Georgia, 61, 104–105, 106
Georgia Ornithological Society, 271
Geothlypis trichas, 158–159, 161
Godwit, Marbled, 247
Golden-eyes, 6, 34, 35
Goldfinch, Eastern, 244
Goosander, 34, 43
Goose, 4-5, 8–10, 43
Abyssinian Blue-winged, 11, 12, 14, 50
African Pygmy, 31
African Spur-winged, 27, 28, 43, 47 (fig. 21). 48, 50, pl. 7
Andean, 13
Ashy-headed, 13, pl. 5
Bar-headed, 37
Barnacle, 37
Bean, 9, 37
Blue, 37, 131
Canada, 131, pl. 2
Cape Barren, 5, 11, 12, 13, 42, 43, 48, 50, pl. 4
Chinese, 51
Egyptian, 5, 6, 12, 14, 51
Emperor, 37
Gray, 51
Green Pygmy, 31
Grey-Lag, 51
Hawaiian, 9, pl. 2
Indian Pygmy, 31
Kelp, 13
Lesser White-fronted, 9
Magellan, 13, 48, pl. 5
Maned, 5, 27, 30–31, 42, 47 (fig. 19), 48, 129
Orinoco, 11, 12, 14, 43, pl. 6
Pied, 5, 27, 28, 42, 43, 50, pl. 6
Pink-footed, 9, 37
Red-breasted, 37
Ross's, 37
Ruddy-headed, 13
Snow, 37, 131, 202
Sushkin's, 9, 37
White-fronted, 9, 202
Goslin, Robert. Bird remains from an Indian village site in Ohio, 131
Grackle, Boat-tailed, 266
Grallaria, 123
perspicillata, 126
Grebe, Pied-billed, 131, 244
Western, 76
Greene, Earle R., William W. Griffin, Eugene P. Odum, Herbert L. Stoddard, Ivan R. Tomkins, and Eu-

gene E. Murphey. "Birds of Georgia" (reviewed), 209–210
Griffin, William W., see Greene, Earle R., *et al.*
Grinnell, Joseph, and Alden H. Miller. "The Distribution of the Birds of California" (reviewed), 207–209
Griscom, Ludlow. "Modern Bird Study" (reviewed), 137; review by, 207–209
Grosbeak, Rose-breasted, 101, 102, 105, 194 (footnote)
Grouse, Prairie Sharp-tailed, 90–91
Ruffed, 131
Grus canadensis canadensis, 131
c. tabida, 131
Guatemala, 217, 218–223
Guira guira, 189, 190
Gull, Black-headed, 64, 70
Bonaparte's, 204
Herring, 202
Ring-billed, 77, 204
Gymnopithys bicolor, 123

Habia rubica, 189
Haliaeetus leucocephalus, 131
Hamerstrom, Frances, review by, 81
Haplospiza unicolor, 189
Hawk, Marsh, 131, 247
Red-shouldered, 131
Red-tailed, 129, 131
Sparrow, 203
Hedymeles ludovicianus, 101, 102, 105, 194 (footnote)
Heliobletus contaminatus, 189
Helmitheros vermivorus, 107, 262
Hemitriccus diops, 189
Heron, Great Blue, 131
Green, 96
Heteronetta atricapilla, 36, 54
Hickey, Joseph J. Birds of the Deciduous Forest(Part 3 of Symposium), 245–246
Hicks, Lawrence E. Some West Virginia breeding-season records, 129–131
Hirundo erythrogaster, 203
Histrionicus histrionicus, 32, 34, 48
Holland, Ray P., see Hunt, Lynn Bogue, and—
Hummingbird, Broad-tailed, 174 (fig. 5), 175
Mexican Violet-eared, 165-187
Ruby-throated, 203
Swallow-tailed, 189, 190
White-eared, 168, 171, 174 (fig. 5), 175, 176, 179
Hunt, Lynn Bogue, and Ray P. Holland. "Game Birds of America" (reviewed), 81
Hybridization, 9, 19, 22, 27, 28, 30, 34, 51
Hylocharis leucotis, 168, 171, 174 (fig. 5), 175, 176, 179
Hylocichla fuscescens, 99 (footnote), 104, 196
minima, 99 (footnote), 104
mustelina, 195
ustulata, 99 (footnote), 102, 104
Hylophylax naevioides, 123
Hymenolaimus malacorhynchos, 23, 54

Icteria virens, 92, 107
Icterus galbula, 107
spurius, 96, 98, 107
Incubation-patch, 188–190
Indiana, 204
Inland Bird Banding Association, 86

Jaques, Francis L., 80
Jay, Blue, 70, 244
Steller's, 247

Kendeigh, S. Charles. Nesting Behavior of Wood Warblers, 145–164
Kentucky, 202, 265–267
Kingbird, Arkansas, 127
Eastern, 95, 107, 193, 244
Knight, John Alden. "Woodcock" (reviewed), 80–81

Lapwing, 67, 70
Lark, Horned, 247
Prairie Horned, 195
Larus argentatus, 202
delawarensis, 77, 204
philadelphia, 204
r. ridibundus, 64, 70
Lepidocolaptes fuscus, 189
Limnodromus griseus, 89, 133 (fig.), pl. 8
Limnothlypis swainsonii, 107-108, 129
Longevity, 56–74
Longspur, Chestnut-collared, 247
Loon, Common, 131
Lophodytes, see Mergus cucullatus
Lophonetta specularioides, 11, 12, 13, 15, 18, 54
Lophortyx californica, 64
Lorenz, K., 3
Louisiana, 95–96, 97–98, 99–102, 103, 104–105, 106, 108–109, 113–114, 118–119, pls. 9–10
Lovell, Harvey B. Reaction of American Mergansers to Herring Gull depredations, 202
Lowery, George H. Jr. Trans-Gulf Spring Migration of Birds and the Coastal Hiatus, 92–121; review by, 209–210

Malacorhynchus membranaceus, 6, 23, 50, 54
Mallard, 12, 24 (fig.)
Common, 17, 19, 21, 27, 51, 131, 244

Marianas, 21, 39
Mareca, 17; see also Anas
Martin, Purple, 95, 107
Maryland, 261
Mayr, Ernst. "Birds of the Southwest Pacific" (reviewed), 80; see also Delacour, Jean, and—
Mayr, Margaret, translation by, 165–187
Meadowlark, 193, 247
Melanism, 75-76
Melanitta fusca, 32, 33–34, 43, 48
nigra, 32, 33–34, 43, 48
perspicillata, 32, 33–34, 48
Meleagris gallopavo, 131, 204
Melospiza melodia, 198
m. euphonia, 63, 67, 72
Merganetta, 23, 36, 48–49, 54
armata colombiana, 47 (fig. 23)
Merganettini, 7, 36, 44, 45, 48–49, 50
Merganser, 4, 34–35, 48, 50–51
American, 202; see also Goosander
Auckland Island, 33
Brazilian, 33
Hooded, 32, 34, 35, 54
Red-breasted, 34, 43
Scaly-sided, 41
Mergellus, see Mergus albellus
Mergini, 6, 7, 32–35, 43, 44, 45, 48, 49, 50
Mergus, 34–35, 48, 50–51
albellus, 32, 34, 35,
australis, 33
cucullatus, 32, 34, 35, 54
merganser, 34, 43
m. americanus, 202
octosetaceus, 33
serrator, 34, 43
squamatus, 41
Metopiana, see Netta peposaca
Michigan, 75, 129
Microrhopias quixensis, 123
Migration, 62, 92–121, 166–167, 203–204
Miller, Alden H., review by, 138; see also Grinnell, Joseph, and—
Mimus saturninus, 189
Mississippi, 96–97, 98–99, 101, 103, 104–105, 109, 112–113, 115
Mniotilta varia, 97, 98, 147, 162, 262
Molothrus bonariensis, 189, 190
Molt, 8, 16, 20, 22–23, 28, 31, 33, 34, 35, 44, 45, 223, 234, 239
Moore, A. D. Winter Night Habits of Birds, 253–260
Murphey, Eugene E., see Greene, Earle R., *et al.*
Myiarchus crinitus, 127, 195
Myiobius atricaudus, 189
Myioborus miniatus aurantiacus, 223-234, 236
m. connectens, 218 (footnote)
m. hellmayri, 217–223, pl. 12
m. pallidiventris, 224
torquatus, 222, 228, 230, 234–240
Myiochanes virens, 107, 195
Myiodynastes solitarius, 189, 190
Myiozetetes similis, 189
Myrmeciza loricata, 189

Nelson, Theodora, biog. sketch of, 216
Neochen jubatus, 11, 12, 14, 43, pl. 6
Nesochen, see Branta sandwicensis
Nesonetta, see Anas aucklandica
Nesting, 8, 11, 12, 13, 14, 27, 32, 34, 35, 44, 50, 122–128, 145–164, 165–187, 217–242, 261
Netta erythrophthalma, 25–26, 52
peposaca, 25–26, 43
rufina, 25–26, 43
Nettapus, 27, 28, 30, 48
auritus, 31
coromandelianus, 31
pulchellus, 31
Nettion, 6
New forms noticed: Agelaius xanthomus monensis, 139
Amphispiza bilineata carmenae, 268
Amphispiza bilineata sanctissima, 268
Carpodacus cassinii vinifer, 268
Carpodacus purpureus rubidus, 268
Centurus carolinus perplexus, 83
Cyanocitta stelleri atriceps, 139
Lochmias nematura nelsoni, 82
Pelecanus occidentalis murphyi, 268
Pelecanus occidentalis urinator, 268
Polioptila albiloris vanrossemi, 82
Regulus satrapa amoenus, 140
Thryomanes bewickii altus, 82
Troglodytes brunneicollis vorhiesi, 267
New York, 145–164
Niedrach, Robert J. Colorado nesting records of Starlings, 261
Nighthawk, 107, 204, 247
Texas, 109
Nomenclature, 5
Nomonyx, see Oxyura dominica
North Carolina, 61
Nutcracker, Clark's, 247
Nuthatch, Eastern White-breasted, 244
Red-breasted, 247
Nyroca, 6; see also Aythya
affinis, 131
americana, 64
collaris, 131

Odum, Eugene P. The Concept of the Biome as Applied to the Distribution of North American Birds (Part 1 of Symposium), 191–201; see also Greene, Earle R., *et al.*
Ohio, 131, 132, 243–245, 262
Oidemia, see Melanitta nigra
Oklahoma, 76–77, 142
Old-squaw, 32, 34, 48

Onychorhynchus swainsoni, 189
Oporornis agilis, 110–112
formosus, 96, 98, 107
philadelphia, 110-112
Oriole, Baltimore, 107
Orchard, 96, 98, 107
Ostinops decumanus, 189
Otocoris alpestris praticola, 195
Oven-bird, 98, 101, 105, 146, 147, 158, 159, 244
Owl, Barred, 131, 132
Burrowing, 247
Great Horned, 131
Short-eared, 247
Oxyura australis, 35
a. australis, 47 (fig. 22)
dominica, 35
ferruginea, 35
jamaicensis, 35
leucocephala, 35
vittata, 35
Oxyurini, 7, 35–36, 43, 44, 45, 48, 49, 50

Pachyramphus polychopterus, 189
Palmyra Island, 52
Parus bicolor, 193
Passerherbulus henslowi, 130
Passerina ciris, 107
cyanea, 92, 107
Pedioecetes phasianellus campestris, 90–91
Peet, Dr. Max Minor, biog. sketch of, 272
Peters, James Lee. "Check-list of Birds of the World" (reviewed), 206–207; review by, 137–138
Peterson, Roger Tory. Coniferous Forest Birds (Part 5 of Symposium), 247–248
Pettingill, Olin Sewall Jr., biog. sketch of, 216; review by, 80–81
Pewee, Eastern Wood, 195, 244
Wood, 107
Philacte, 6, 9, 37
Phillips, Richard Stuart. Cape May Warblers capturing flying insects, 132
Philohela minor, 77, 131
Phoenicopteri, 7
Phyllomyias griseocapilla, 189, 190
Piaya cayana, 189
Pigeon, Passenger, 131
Pintail, Common, 13, 19, 51
Eaton's, 19, 39
South American Brown, 19, 21, 51
South Georgian, 19
Pipit, Sprague's, 247
Piranga olivacea, 101, 102, 105, 106
rubra, 98, 107
Platycichla flavipes, 189
Plectropterus gambensis, 27, 28, 43, 47 (fig. 21), 48, 50, pl. 7
Plover, Ringed, 64
Upland, 247
Pochard, European, 26
Red-crested, 25–26, 43
Rosy-billed, 25–26, 43
Southern, 25–26, 52
Podilymbus podiceps, 131
Polysticta, 6; see also Somateria stelleri
Population, 56–74
Predation, 129
Procnias nudicollis, 189, 190
Progne subis, 95, 107
Protonotaria citrea, 97, 98, 107
Pseudotadorna, see Tadorna cristata
Pteronetta, see Cairina hartlaubi
Pyriglena leucoptera, 189
Pyrrhura frontalis, 189

Quail, California, 64
Querquedula, 17

Rail, Virginia, 244
Raven, 131
American, 266
Rea, Gene. Black and White Warbler feeding young of Worm-eating Warbler, 262
Redhead, 26, 64
Redstart, American, 92, 96, 98, 156, 157, 159, 162, 194 (footnote)
Collared, 222, 228, 230, 234–240
Costa Rican Orange-bellied, 223–234, 236
Pacific Orange-bellied, 217–223, pl. 12
Red-wing, 198
Eastern, 244
Rhodonessa caryophyllacea, 23, 52, 54
Richmondena cardinalis, 193, 261
Rindisbacher, Peter, 89–91, 133, pl. 8
Robin, American, 56–74, 195, 261
English, 63, 67, 70
Southern, 71, 142
Roosting, 253–260

Salvadorina, see Anas waigiuensis
Sandpiper, Least, 203
Semi-palmated, 203
Sapsucker, Williamson's, 247
Sarkidiornis carunculatus, see S. melanotos
melanotos, 28–29, 43, 48, 49, pl. 7
Scaup, 24 (fig.), 25, 48
Greater, 26
Lesser, 26, 131
Schistochlamys ruficapillus, 189
Schorger, A. W. Bird Portraits by Peter Rindisbacher, 89–91; Absorbent for use in the preparation of scientific skins, 261
Schwartz, Charles W. "The Prairie

Chicken in Missouri" (reviewed), 81
Sclerurus scansor, 189
Scolopax rusticola, 64, 67
sabini, 76
Scoter, 4, 6
Common, 32, 33–34, 43, 48
Surf, 32, 33–34, 48
White-winged, 32, 33–34, 43, 48
Seidel, Alexander, 45 (footnote), 46–47 (figs. 14–23), 80
Seiurus aurocapillus, 98, 101, 105, 146, 147, 158, 159
motacilla, 98, 158, 162
noveboracensis, 101, 105, 108
Selasphorus platycercus, 174 (fig. 5), 175
Sensenig, E. Carl. The formation of pellets by the Barred Owl, 132
Serology, 51
Setophaga ruticilla, 92, 96, 98, 156, 157, 159, 162, 194 (footnote)
Sheldrake, 5, 6
Australian, 14, 15
Common, 12, 14, 15, 43
Korean, 14, 53
Paradise, 15
Radjah, 12, 14, 15
Ruddy, 12, 14, 15, 45, 46 (fig. 16)
South African, 15
Shelford, V. E. (ed.) Bird Distribution and Ecological Concepts, A Symposium of the Wilson Ornithological Club, 191–201, 243-252; (auth.) Part 6. The Relative Merits of the Life Zone and Biome Concepts, 248-252
Sheppard, R. W. Gulls and terns hawking flying insects, 204
Shortt, Terence M. Baikal Teal *(Anas formosa)*, frontispiece
Shoveller, 50
Australian-New Zealand, 17, 22
Cape, 22, 52
Common, 22
South American, 17, 22
Siskin, Pine, 247
Skutch, Alexander F. On the Habits and Nest of the Ant-thrush *Formicarius analis*, 122–128; Studies of Central American Redstarts, 217–242
Smew, 32, 34, 35
Snipe, Common, 76
Sabine's, 76
Wilson's, 75–76, 89
Solitaire, Townsend's, 247
Somateria, 6, 32, 43, 48
fischeri, 33, 52
mollissima, 33
spectabilis, 33
stelleri, 33
Sooter, Clarence A. Soaring geese at Tulelake, California, 202
South Africa, 26 (footnote)
South Carolina, 61
Sparrow, Baird's, 247
Eastern Lark, 131
Eastern Swamp, 244
Henslow's, 130
Mississippi Song, 244
Song, 63, 67, 72, 198
Spatula, 17, see also Anas
Spiza americana, 108, 130
Spot-bill, 21
Starling, 63, 67, 70, 72, 261
Sterna hirundo, 204
Stevens, O. A. Grassland Birds (Part 4 of Symposium), 247
Stictonetta naevosa, 6, 24, 42, 43, 54
Stoddard, Herbert L. Sr., biog. sketch of, 272; see also Greene, Earle R., *et al.*
Strix varia, 131, 132
Sturnella magna, 193
Sturnus vulgaris, 63, 67, 70, 72, 261
Sutton, George Miksch, review by, 265–267
Swallow, Barn, 203
Swan, 8, 9, 43
Bewick's, 8, 37
Black, 8, 10, 49
Black-necked, 8, 9
Mute, 8, 9, 10
Trumpeter, 8, 37, 131
Whistling, 8
Whooper, 8
Swan-goose, 51
Synallaxis, 127
Syndactyla rufosuperciliata, 189

Tachyeres, 6, 11, 15, 38
Tadorna, 5, 6, 11, 12, 13, 14–15, 52
cana, 15
cristata, 14, 53
ferruginea, 12, 14, 15, 45, 46 (fig. 16)
radjah, 12, 14, 15
tadorna, 12, 14, 15, 43
tadornoides, 14, 15
variegata, 15
Tadornini, 7, 11–15, 44, 45–48, 49, 50
Tanager, Scarlet, 101, 102, 105, 106
Summer, 98, 107
Tanagra chalybea, 189
Taxonomy, 3–6, 53 (fig. 24), 79
Teal,
Andaman, 20, 39
Andean, 39
Auckland Island, 20, 52
Baikal, 29, 79, frontispiece
Blue-winged, 17, 22, 131
Brazilian, 27, 30, 51
Brown, 20, 39, 50, 52

Cape, 19
Chestnut-breasted, 20
Cinnamon, 17, 22–23
Cotton, 31
Falcated, 20
Garganey, 17, 22
Gray, 20
Green-winged, 19
Hottentot, 19
Laysan, 21, 39, 52
Madagascan, 20
Marbled, 19, 23
Ringed, 23, 46 (fig. 18) 48, 51, 54
Versicolor, 19, 23, 43
Yellow-billed, 19, 21
Tennessee, 102, 103, 104–105, 106
Tern, Black, 204
Common, 204
Territory, 145–163, 168, 172–175
Thalassornis leuconota, 36
Thlyposis sordida, 189
Thorp, George B., letter, 144
Thraupis ornata, 189
Thrush, Gray-cheeked, 99 (footnote), 104, 247,
Hermit, 247
Olive-backed, 99 (footnote), 102, 104
Song, 63, 67, 68, 70
Wood, 195
Thryomanes bewickii, 127
Thryothorus ludovicianus, 193
Titmouse, Tufted, 193, 244
Tityra cayana, 189, 190
Tomkins, Ivan R., see Greene, Earle R., *et al.*
Trautman, Milton B., see Van Tyne, Josselyn, and—
Trautman, Milton B., and Mary A. Trautman. Ring-billed Gulls fly-catching, 77
Trichothraupis melanops, 189
Troglodytes, 127
aëdon, 72
musculus, 189
Trogonurus rufus, 189
Turdus e. ericetorum, 63, 67, 68, 70
m. merula, 58, 63, 67, 68, 70
migratorius, 56–74, 195, 261
migratorius achrusterus, 71 (footnote), 142
Turkey, 131, 204
Tympanuchus cupido, 131, 195
c. pinnatus, 90–91, 133
Tyrannus tyrannus, 95, 107, 193
verticalis, 127

Utah, 52

Vanellus vanellus, 67, 70
Van Tyne, Josselyn. A melanistic specimen of Wilson's Snipe, 75–76; reviews by, 80, 81, 206–207, 265
Van Tyne, Josselyn, and Milton B. Trautman. Migration records from Yucatan, 203–204
Veery, 99 (footnote), 104, 196
Vermivora chrysoptera, 101, 104, 156
peregrina, 104
pinus, 101, 102, 104
ruficapilla, 101, 102, 104, 108–109, 148
superciliosa, 222
Violet-ear, Mexican, 165–187
Vireo flavifrons, 98, 107
gilvus, 107, 109
griseus, 97, 98
olivaceus, 96, 107, 198, 199
philadelphicus, 101, 104, 109
Vireo,
Philadelphia, 101, 104, 109
Red-eyed, 96, 107, 198, 199, 244
Warbling, 107, 109
White-eyed, 97, 98
Yellow-throated, 98, 107
Virginia Society of Ornithology, 86
Voice, 7, 8, 10, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 25, 28, 31, 33, 35, 36, 44, 122, 145–164, 169–170, 219, 221, 223, 225, 235
Vulture, Turkey, 203

Wagner, Helmuth O. Notes on the Life History of the Mexican Violet-ear, 165–187
Warbler, Bay-breasted, 101, 105, 108, 247
Black and White, 97, 98, 147, 162, 262
Blackburnian, 98, 101, 105, 146 (fig. 1), 153–154, 162
Black-poll, 101, 102, 105, 247
Black-throated Blue, 104, 149–152, 162
Black-throated Green, 101, 105, 147 (fig. 2), 152–153, 154, 162
Blue-winged, 101, 102, 104
Buff-rumped, 222, 227, 230, 232
Canada, 101, 105, 146 (fig. 1), 159
Cape May, 101, 104, 132, 247
Cerulean, 96, 98
Chestnut-sided, 101, 105, 150, 154-157, 162
Connecticut, 110–112
Eastern Yellow, 244
Golden-winged, 101, 104, 156
Hartlaub's, 222
Hooded, 97–98, 107
Kentucky, 96, 98, 107
Magnolia, 101, 104, 146, 147 (fig. 2), 148, 162, 247
Mourning, 110–112
Nashville, 101, 102, 104, 108–109, 148
Parula, 97, 98, 107, 247
Pink-headed, 222, 230

Prairie, 107, pl. 11
Prothonotary, 97, 98, 107
Sutton's, 130
Swainson's, 107–108, 129
Sycamore, 130
Tennessee, 104
Wilson's, 109–110
Worm-eating, 107, 262
Yellow, 96, 101, 102, 196, 198
Yellow-throated, 97, 98, 107
Water-thrush, Louisiana, 98, 158, 162
Northern, 101, 105, 108
Weight, 185
West Africa, 28
West Virginia, 129–131
Wetmore, Alexander, Record of the Turkey from the Pleistocene of Indiana, 204
Widgeon, 49
American, 21–22
Chiloë, 16, 21–22, 51
European, 21–22, 51
Willett, George. Obituary, 205
Wilson Ornithological Club, Library, 88, 143, 215, 216, 264; Membership Roll, 273–301; New Life Members, 88, 135, 216, 272; Reports, 86–87, 143, 144, 262; Symposium, 191–201, 243–252
Wilsonia canadensis, 101, 105, 146 (fig. 1), 159
citrina, 97–98, 107
pusilla, 109–110
Woodcock, American, 77, 131
European, 64, 67
Woodpecker, Eastern Hairy, 244
Hairy, 159
Ivory-billed, 131
Northern Downy, 244
Pileated, 131
Wren, Bewick's, 127
Carolina, 193
House, 72, 127
Long-billed Marsh, 244
Rock, 247

Xenonetta nesiotis, see Anas aucklandica
Xiphocolaptes albicollis, 189

Yellow-throat, 158–159, 161
Northern, 244
Yucatan, 92, 112–116, 118, 203–204

Zenaidura macroura, 193, 198

TO OUR CONTRIBUTORS

Our members are asked to submit articles for publication in the *Bulletin*. Manuscripts will be accepted with the understanding that they have not been published or accepted for publication elsewhere.

MANUSCRIPT. Manuscripts should be typed on paper of good quality and of letter size (8½ x 11). Write on one side only and use double spacing. The title should be brief and carefully constructed so as to indicate the subject clearly. Ordinarily the scientific names of the birds treated should be given and should appear early in the article. Most articles should have a brief summary at the end.

BIBLIOGRAPHY. Literature referred to in the text should be cited by author's name, year of publication, and exact pages of the particular reference. Such citations should ordinarily be listed in full at the end of the paper.

ILLUSTRATIONS. Photographic prints, to reproduce well as half-tones, should have good contrast and detail. Please send prints unmounted, and attach to each print a brief but adequate legend. Do not write heavily on the backs of photographs.

PROOF. Authors are requested to return proof promptly. Expensive alterations in copy after the type has been set must be charged to the author.

REPRINTS. The Club is unable to furnish free reprints to authors. Arrangements will be made, however, for reprints to be made at cost.

REPRINT SCHEDULE OF THE WILSON BULLETIN

	1 page	2 pp.	4 pp.	8 pp.	12 pp.	16 pp.	Additional Each 4 pp.
100 copies	$1.95	$2.10	$2.40	$4.15	$5.90	$7.65	85c
Each additional 100 copies	70c	85c	1.40	2.10	2.90	3.50	35c

Covers: $3.85 for first 100 copies; $1.40 for additional 100 copies.
Charge will be made for a minimum of 100 reprints.

Orders for reprints should accompany the returned galley proof. Contributors are asked not to pay for reprints in advance. Bills for reprints, transportation, and tax are sent to authors by the press.